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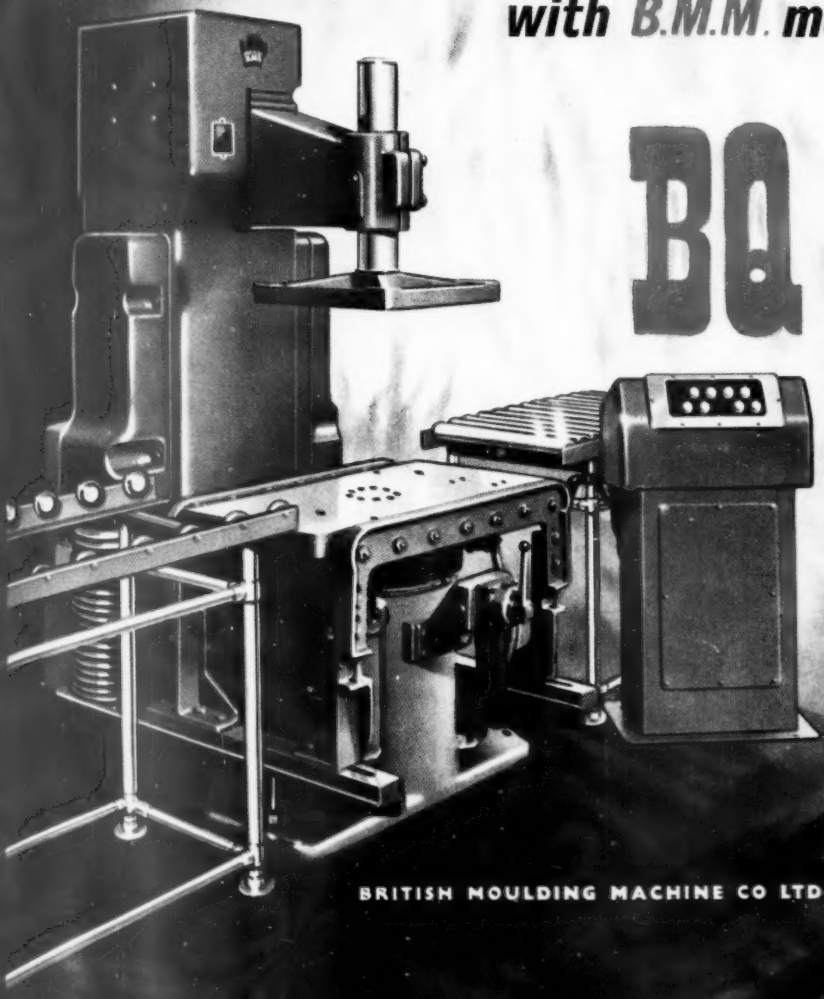

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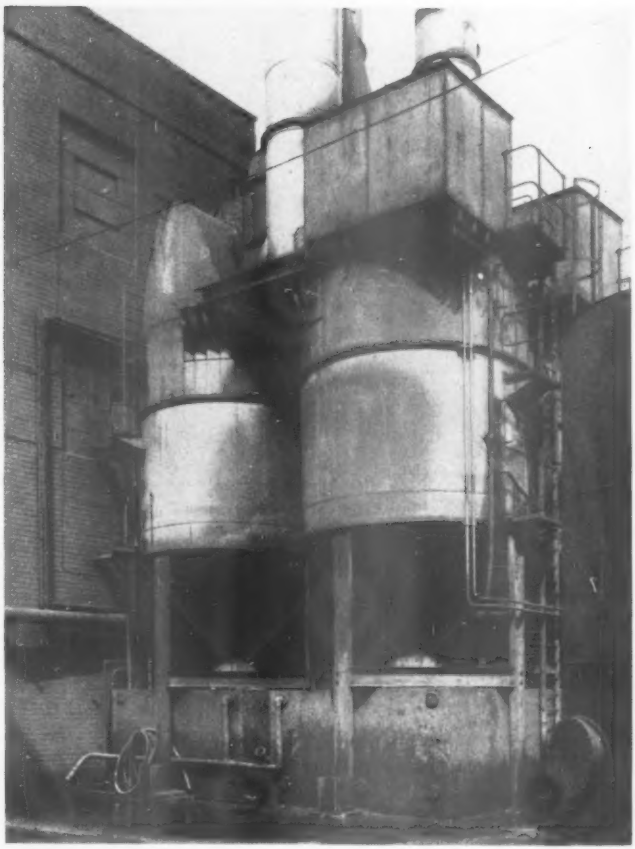

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FOUNDRY
TRADE JOURNAL

Vol. 107 OCTOBER 15, 1959 No. 2236

The Madrid Conference*

Over 1,400 foundrymen with their ladies came from all over the world to participate in the 26th Congress of the International Committee of Foundry Technical Associations. The organization for the reception of this large number of guests was extremely good, whilst the programme arranged for their instruction and entertainment was indeed praiseworthy. It is not generally realized how difficult is the preliminary work so to arrange technical sessions, committee meetings, works visits and social events that there are no clashes of personal interests within a reasonable number of days. The bulk of the work fell on the shoulders of Mr. Andres, who made light work of his Herculean task. The new system of paying an overall amount for the whole of the Congress functions introduces a task for the organizers to ascertain who will be attending what, so a control has to be imposed, without which very serious money losses would be incurred, as initially everybody has tickets for everything.

From the British point of view, this Congress sees the end of an era, for the secretariat of the International Committee—the sponsors—has been changed. Since the inception of the Committee in 1927, the secretariat has been in Manchester, from where both the late Mr. T. Makemson and, following him, Mr. G. Lambert, have served the organization well in an honorary capacity. Now, with a higher rate of subscription from members, the secretaryship (no longer to be honorary) is to go to Dr. P. W. Muller, of Zurich, Switzerland. Dr. Muller heads a firm of association management specialists of a similar type to Peat, Marwick, Mitchell or Heathcote and Coleman in this country. We wish Dr. Muller every success in his new appointment.

The Congress Banquet, at which over 1,000 guests were present, was a brilliant success, the service of the courses being carried through rapidly with almost military precision. Mealtimes in Spain are somewhat later than those to which most delegates are accustomed and an early dinner means a nine-o'clock start, but 11 o'clock is quite normal. Yet the morning functions start at nine or ten without anybody showing ill-effects from late nights. The British delegation at the Congress was very representative and included leading personalities from the iron, steel and non-ferrous founding industries and research. During the opening ceremony at which the speakers were Dr. A. Dacco, the president of the International Committee, Mr. Plana, president of the Congress, and the Minister for Industry, excellent simultaneous translation removed all the tedium of listening to speeches in an unknown tongue.

Madrid is a delightful city, having wonderful art-galleries, magnificent parks and a plethora of beautiful and magnificently sited buildings. Despite late hours and a full programme of technical and social events, the delegates enjoyed an unforgettable and satisfying experience.

* See also page 308 of this issue.

Spanish Foundry Industry*

There are about 1,000 foundries in Spain, but many of them are quite small. In the last few years, several of them have been mechanized, some with British plant. There is a surprising number of steel foundries—something of the order of 50 or 60—a quite high figure for one of the lesser industrialized countries of Europe. Recently, there has been a visit to America by a Spanish foundry productivity team and much enthusiasm was aroused, of which the first expression is "great interest in management studies." This apparently is taking preference over research and perhaps even craft training in Spain, though it is understood that a new technical school has been established in Madrid, where the techniques of moulding and patternmaking will be taught. In Spain, also there are still quite a few lead foundries, casting gargoyles for churches.

The Spanish foundry industry is, in the writer's view, not too well organized, founders technical activities forming just a part of the national iron and steel institute. However, the ironfounders of Barcelona have an association—the Gremio—which is very active. There are no trade unions and the whole set-up is governed by *syndicates* which represent both employer and employed. One feature of this system is that redundant employees cannot be discharged, with the result that foundries tend to be overstaffed.

Yet the writer deems the Spanish foundry industry to be full of promise. It is, with others, at present being supported by American dollars and soon will have the right to import freely. Thus it is a market which should be studied by the British foundry-equipment industry.

The Spanish founders monthly magazine *Fundicion*, is achieving increasing status and is making a serious endeavour to increase its Mexican and South American reader coverage. Again, the circulation of the FOUNDRY TRADE JOURNAL in Spain is quite important and is, it is understood, much appreciated by the Spanish foundry owners on account of its practical approach to technical problems. Finally, it is clear that the Spanish foundry industry is alive to its needs and the only hindering factor at the moment is the lack of foreign currency—a feature which it is hoped will be short lived.

* From comment on the position and status of the foundry industry in Spain received in correspondence from the Editor of the JOURNAL, who is at present attending the International Foundry Congress in that country.

Correspondence

BISF MANAGEMENT COLLEGE

To the Editor of the FOUNDRY TRADE JOURNAL.

SIR,—It was interesting to see the article on the British Iron & Steel Federation's Management College in your issue of September 24 (p. 218) and your representative's impressions confirm the great value which the steel industry attaches to this form of training. As a frequent speaker on these courses, the writer was struck by your representative's opinion that the existence of a National Foundry Craft Training Centre and the National Foundry College would make it "unnecessary for founders to follow this lead, as the existing system within the industry is *in every way adequate*."

One of the most profound changes in post-war industry has been the increasing complexity and responsibility of management. Apart from manufacturing knowledge and product development, the modern manager is forced to make decisions which, if soundly based, require acquaintance with such management tools as work-study, costing and cost control, labour relations, safety and training—to name but a few.

The foundry industry can legitimately be proud of the establishment of the National Foundry College so many years ago and of the preparation for management tasks which is given in its courses. Some years ago, the Council of Ironfoundry Associations' Training Committee set up short courses for foundry supervisors and foremen designed to improve the management skills of this important group of foundry management. They were initially considered an experiment but have now been established successfully and are widely used in the industry.

In a way this confirms that there exists a need for improving the skills of those who are already in management positions and whose further training does not fall within the sphere of existing institutions. In the writer's opinion there is a need for the further development of such courses not only in the steel but also in the foundry industry. They would need to be concerned with management training but firmly based on problems of the foundry industry rather than being as general in scope as the many existing courses provided by colleges and independent outside organizations.

It is open to question whether our industry could support a venture like the Management College of the steel industry, but surely it would be wrong to regard the existing facilities for the training of managers within the foundry industry as necessarily adequate.

For these reasons the writer differs from your representative's assessment of the situation, especially as he believes that greater efforts in this field would pay through improved efficiency and greater enterprise.—Yours, etc.,

F. C. HAYES,
Education and Training Officer.
Council of Ironfoundry Associations,
14, Pall Mall, London, S.W.1.

Forthcoming Events

OCTOBER 19

Institution of Production Engineers

Derby section : "What's New in Casting," by A. Short, 7 p.m., St. James's Restaurant, St. James's Street.

OCTOBER 20

Institute of British Foundrymen

Coventry section : Evening works visit to Fort Dunlop.

OCTOBER 21

Institution of Production Engineers

Halifax and Huddersfield section: "Productivity and Exports," by J. B. Scott, 7 p.m., at the Percival Whitley College of Further Education, Francis Street, Halifax.

Institute of British Foundrymen

London branch: "Specification Requirements for Gunmetal Castings," by F. Hudson, F.I.M., 7.30 p.m., at the Constitutional Club, Northumberland Avenue, W.C.2.

OCTOBER 22

Combustion Engineering Association

Western Region: Whole-day meeting commencing 10.30 a.m. with "Technical Application of Fuel-oil in Industry," by D. J. Heslop. Luncheon 1 p.m., followed at 2.15 p.m., by a film on "Cyclone Firing." Meeting will be held at the Royal Hotel, College Green, Bristol.

OCTOBER 23

Institute of British Foundrymen

Wales and Monmouth branch : "Foundry Costing," by W. E. Harrison, 7 p.m., at Llanelly Technical College.

OCTOBER 24

Institution of Production Engineers

London graduate section: Whole-day visit to Norton Grinding Wheel Company, Limited, Welwyn Garden City, Herts.

Institute of British Foundrymen

Bristol & West of England branch: "Some Aspects of Small Foundry Practice," by F. P. Robinson, 2.30 p.m., at the Central Technical College, Belmont Road, Exeter.

The Foundry Industry of the United Kingdom . . . . . its Organization and Capacity*

(Slightly Abridged)

By A. R. Parkes

Foundrymen in other countries are seldom able to visualize the way in which the separate aspects of research, technology, and production are organized within the foundry industry of the United Kingdom. This paper is intended to clarify such matters for the benefit of international understanding. British founders have three establishments engaged on research, operating independently of each other, one for cast-iron, a second for steel, and a third covering non-ferrous metals generally. On the ironfounding production side alone, there are some 20 separate employers' associations, mainly dealing with groups of products and coming within the orbit of the Council of Ironfoundry Associations. Light-metal founders, steelfounders, copper-base and zinc-alloy founders have their own associations, as do the makers of non-ferrous ingots and pig-iron, and the suppliers of plant and equipment for the industry. Then there is the pattern-makers association and a grouping of investment founders, both separately established. The set-up and inter-relation of all these associations is dealt with in this paper. Comments are included on the integration of the UK industry on the technical side with the Institute of British Foundrymen. The rôle of the Institute of Vitreous Enamellers as it affects foundry products is also mentioned, as are education and training and the specialized services rendered by organizations sponsoring increased usage of certain metals. A further purpose of the paper is illustration (by selected pictures) of some of the achievements of British foundrymen in recent years, and the recording of the industry's capacity and production statistics.

To those in whose minds are instilled the virtues of logic, the UK foundry industry may appear as an irrational agglomeration of constituent authorities. In this respect, it is different from most European countries—where there is usually one overriding directive authority—but is similar in some degree to foundry organization in the United States. However, despite the apparent lack of co-ordination, the UK system works well in practice and in the finality, actual results are the only true criterion of efficiency.

INTRODUCTION

The Author had some misgivings over the selection of the title for this Paper, as the use of the word "organization" may, when interpreted for a foreign audience, perhaps give the idea of a system of control such as is found in the military sphere, with severely regular and definite gradations of authority—from commander at the highest level to the humble infantryman at the lowest. This is quite wrong, for in the foundry industry of the United Kingdom there is no such central control or directive authority. Instead, there is in the UK a multiplicity of almost autonomous foundry associations, loosely integrated in certain specific and limited aspects. In having this loose set-up, the UK foundry industry is more like that of the United States than the foundry industries of the Continent of Europe, where there is often an overriding directive foundry authority. Thus, reduced to essentials, the word "organization" in this Paper must be understood to mean a diversification of activity within the industry, the very antithesis of singleness of control. Hitherto, foundry visitors or correspondents from other countries have often experienced considerable difficulty and confusion in making contact with their "opposite numbers" in Great Britain, whether for social or busines purposes or works visits. It is hoped that this paper will help them.

"Tied or Untied"

At the outset it must be pointed out that the foundry industry in the United Kingdom is regarded as being a completely separate undertaking from forge work or rolling or even the casting of ingots. The writer is aware that this is somewhat different from the meaning of the word "foundry" in many Continental countries, where it does in fact widely embrace steelworks, rolling and forging activities also. "Foundrywork" in the UK covers the melting of metal for castings, making of moulds or dies, cores, etc., and the pouring of metal into the moulds to produce shaped castings. After trimming and fettling, such castings are inspected and often passed for sale to engineering works for machining. Alternatively, of course, the castings may be passed from the foundry to machine-shops within the same works. In the latter case, the foundry is called a "tied"

* Paper presented by the Author at the first Congress of the Hungarian Foundrymen's Association, 1959.

foundry and, naturally, concentrates attention on castings to be subsequently machined or built into finished goods sold by the company. A foundry which is not "tied" sells fettled castings on the open market. A realization of the co-existence of these two methods of production is necessary for the appreciation of different economic considerations governing the two types of foundries.

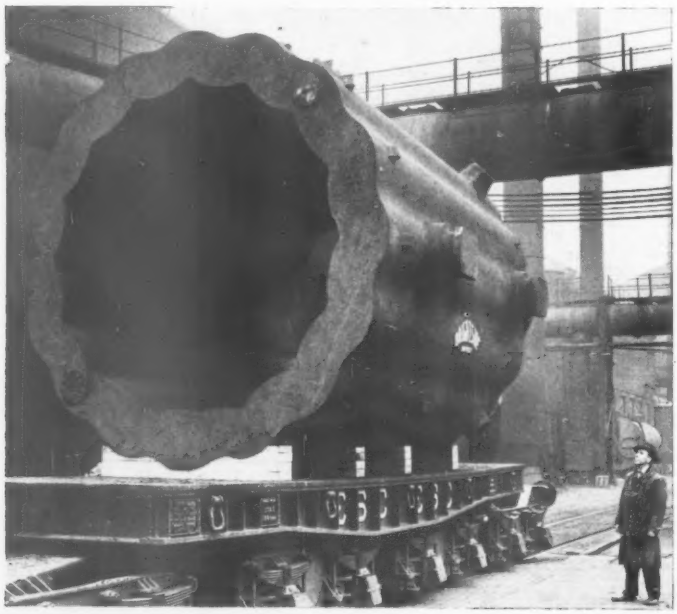
It must be pointed out—but briefly—that there is at present very little State ownership of foundries in the United Kingdom and the present political parties are widely divided in opinion on the advisability of extending State ownership of the UK iron and steel industry and with it the foundries. At present, the Conservative Party government, which has a majority in Parliament, is pledged to support free-enterprise in industry generally, whilst retaining nationalized operation of coal-mining, transport, and light and power undertakings. During the post-war government of the Socialist Party, a scheme was carried through in 1949 for the nationalization of the country's leading iron and steel works and with them the foundries "tied" to those works. When, however, at the general election in 1954 the Conservative Party regained control and the steel nationalization Act was revoked, the steelworks were placed in the hands of an intermediate body called the Iron & Steel Realization Agency. Since then, most of the iron and steel works have been re-sold to their original owners. In the early 'fifties, however, following the revocation of the nationalization of iron and steel, there was set up the Iron & Steel Board for the purpose of overall economic management of the iron and steel industry of the country on a very broad basis. In this Board is vested a loose control of major development schemes which have to do with the ironfounding industry.

It follows from the existing State control of UK coal-mining, rail, road, and water-transport organizations and light and power industries that any foundries attached to these—and there are some (chiefly amongst the railway undertakings)—are also State controlled. In wartime, too, many foundries were operated for, or by, the Ministry of Supply, but most if not all of these have now reverted to private ownership. Just one other example of a State-controlled UK foundry may be cited—that is, a foundry operated inside one of HM prisons!

Broad Inter-relationships

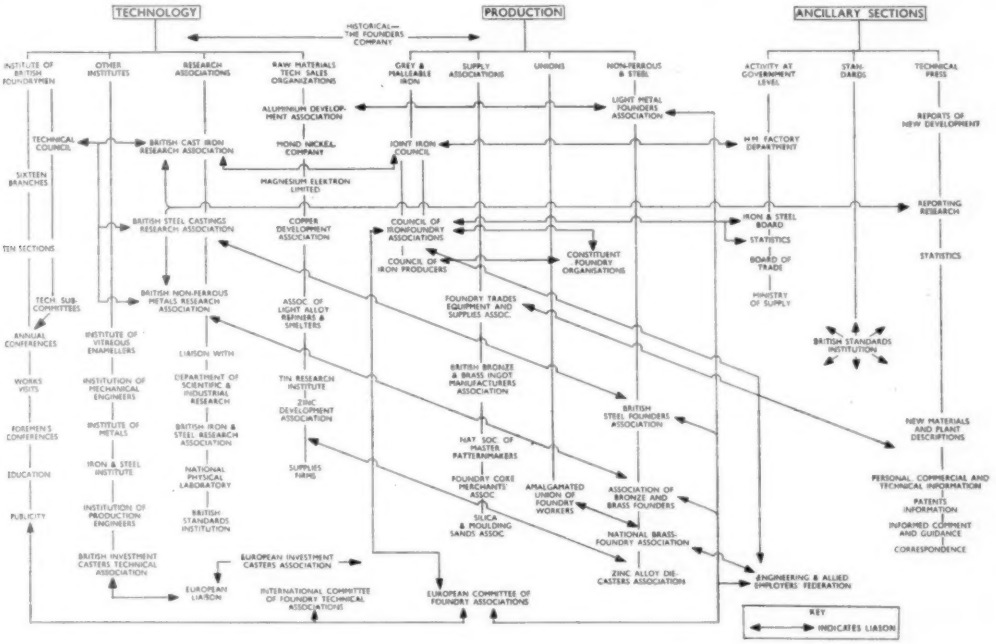
Table 1 sets out a basic conception of the UK foundry industry, which will be seen listed under two main kinds of activity, those of technology and production, with auxiliary headings to draw attention to contacts with Government departments and—not unimportant—the rôle of the technical Press. In some cases, lines of linkage have been drawn on the chart to indicate where and at what level integration exists between different associations within the industry. Not all of these liaisons can be shown in this way, however, as they would too much complicate the diagram, but it is hoped to elaborate these matters in the text referring to specific associations. Names of various foundry employer associations and technical and research bodies are shown in Table 2.

Finance for the operation of these associations and for research organizations is mostly levied from individual firms and, once again, there is no common method for doing this. In addition, approved research associations receive grants of money collected through the general taxation system of the country and disseminated for scientific purposes by the Department of Scientific and Industrial Research (DSIR). For association work, in some cases money is levied on a tonnage basis from constituent foundry members. In others, it is levied on a basis of productive-wages paid, and in yet further instances, fixed sums are payable irrespective of a concern's size.



Cast-iron ingot-mould weighing 150 tons, produced by the Brightside Foundry & Engineering Company, Sheffield.

TABLE 1.—*Diagrammatic Representation of Liaisons existing between Associations embodied in the UK Foundry Industry.*



Historical Note

The oldest organization associated with the UK foundry industry is the Worshipful Company of Founders. Its records go back to the year 1275, and obviously used to be an association of master-men concerned with non-ferrous founding. It is one of the 80 or so City Livery Companies which were once an integral part of the government of the City of London. Up to comparatively recent years, the Founders' Company had the duty of stamping sets of weights to guarantee their accuracy and conformity with the law of the land—a duty now undertaken by the Board of Trade. To-day, the membership of the Founders' Company includes only about 25 per cent. of men drawn from the actual foundry industry, the rest being business and professional people.

EMPLOYERS' ASSOCIATIONS

In the earlier remarks, it is hoped that a rough idea of the place of the foundry industry in the country's social and economic scheme has been given and the statistics quoted in Tables 3, 4 and 5 should add substance to the broad outlines reported. In addition, these figures give an overall view of the productive capacity of the UK foundry industry.

Ironfounding

Foremost and largest amongst the UK groupings of foundry employers are those which cover ironfounding. On a size basis, the ironfounders in the UK account for a production of 3¼ million tons of grey and malleable iron castings annually from a total personnel of about 138,000. As will be seen from Table 2, there are groupings of employers' associations: (*a*) according to category of iron castings produced and (*b*), for those not so covered, according to the district in which the foundry premises are situated. Over 80 per cent. of the UK ironfoundry firms, no matter to which group they belong, are now represented by the Council of Ironfoundry Associations (CFA). Nowadays, the Council comprises 15 full-member associations (see Table 2), including one large federation (National Federation of Engineering and General Ironfounders) which itself is constituted to represent two other federations (Ironfounders National Confederation (INC) and the National Ironfounding Employers Federation (NIEF)).

The UK producers of pig-iron—to be used for foundry purposes as distinct from steelmaking—have organized themselves into the Council of Iron Producers (CIP). This association and the CFA, which in fact represents consumers of pig-iron, together form the Joint Iron Council, founded in 1945.

It follows that the Joint Iron Council and its constituent associations embrace all sections of the UK ironfounding industry. The total membership is about 1,100 firms out of a total of 1,750 separate firms in the UK which practice ironfounding. Through the JIC, producers and users of pig-iron work together, (using a secretariat housed centrally

in London) on all matters affecting common interests, excepting negotiations on wages and conditions of labour-hire and casting selling-prices.

The money required to finance the organization of the JIC and—through it—about two-thirds of the cost of maintenance of the British Cast Iron Research Association—as well as substantial contributions made to the Institute of British Foundrymen (about £2,000 per annum), the National Foundry College and the National Foundry Craft Training Centre—is provided through a levy of a shilling or so per ton of pig-iron used in foundries. This levy is made with Government approval.

British Steel Founders' Association

In December, 1944, all the then-existing associations of steelfounders were brought under the British Steel Founders' Association (BSFA), which became the only representative organization of the British steelfounding industry as a whole. It has the avowed intention of meeting post-war problems by passing onto customers the full benefit of constant technical progress whilst, at the same time, establishing a maximum degree of security for all concerned in the industry, by ensuring a margin between selling price and cost of production adequate to yield a reasonable profit, in addition to financing capital replacement, development and research on a proper scale. In 1951, the BSFA was finally established in its own independent headquarters in Sheffield.

Structure of the Association

The BSFA is a voluntary and unincorporated body comprising either as full members or affiliated makers, nearly all the major producers of steel castings in the United Kingdom; it represents over 80 per cent., by volume of production, of the industry; it imposes no pressures or sanctions other than those of good faith and goodwill between members; it is fully democratic and, by means of a well-devised committee structure, provides for the continuous adjustment of association policy to changing circumstances and the intentions of members. To defray the cost of the secretariat and other work in which the Association is involved, finance is collected from member firms on the basis of a levy per ton of castings produced which come under the scope of the Association.

Fields of Activity

As good design is more than ever necessary for the correct functioning of a casting made in steel, it is the policy of the BSFA to create an atmosphere of confidence and consultation on design, etc., between founders and users of steel castings. This is accomplished through the medium of customer/founder conventions—special meetings arranged with particular classes of customer—and through educative literature. The Association has also issued a series of booklets drawing attention to the possible applications and fields of use in which steel castings are preferable to other materials and where founding is better than any other method of manufacture. The Association has set up a

TABLE 2.—*Principal Technical, Research, Employer and Employee Associations of the UK Foundry Industry (names and addresses of branch and section secretaries published at monthly intervals in the* FOUNDRY TRADE JOURNAL).

EMPLOYERS' ASSOCIATIONS

Ironfounding

Joint Iron Council (secretariat, 14, Pall Mall, London, S.W.1).
Council of Ironfoundry Associations (14, Pall Mall, London, S.W.1).
Association of Automobile and Allied High-duty Ironfounders.
British Ironfounders' Association.
British Bath Manufacturers' Association.
British Malleable Tube Fittings Association.
Cast-Iron Chair Association.
Cast-Iron Axlebox Association.
Cast Iron Heating, Boiler and Radiator Manufacturers' Association.
Cast Iron Pressure Pipe Association.
Cast Iron Segment Association.
Greensand Pipe Founders' Association.
National Association of Malleable Ironfounders.
National and Midland Ironfounders Association.
Roll Makers Association of Great Britain.
National Ingot Mould Association.
National Federation of Engineering and General Ironfounders.
Ironfounders' National Confederation (branches in East and West Ridings; London, Home and Eastern Counties; Midlands and North Midlands; North Western).
National Ironfounding Employers' Federation (branches in Leeds and district; Leicester and district; Liverpool and district; Manchester and district; Monmouthshire (including Cardiff and district); North of England; North Staffordshire; Scottish Ironfounders' Association; Sheffield and district; South of England; Welsh Engineers' and Founders' Association; West of England; West Riding).
Council of Iron Producers.
Cylinder and Refined Iron Association.
Foundry Pig Iron Producers' Association.
National Association of Hematite Pig Iron Makers.
Scottish Ironmasters' Association.
South Staffordshire Iron and Steel Association.

Steelfounding

British Steel Founders' Association (secretariat, Broomgrove Lodge, 13, Broomgrove Road, Sheffield 10).

Brassfounding

Association of Bronze and Brass Founders (secretariat, Heathcote and Coleman, 69, Harborne Road, Edgbaston, Birmingham 15).
National Brassfoundry Association (secretary, E. N. Hiley, 4, Calthorpe Road, Five Ways, Edgbaston, Birmingham 15).

Light Metal Founding

Light Metal Founders' Association, 69, Harborne Road, Edgbaston, Birmingham 15.
Association of Light Alloy Refiners and Smelters (ALAR), 3, Albemarle Street, London, W.1.

Equipment and Supplies

Foundry Trades' Equipment and Supplies Association, 94/98, Petty France, London, S.W.1.
National Society of Master Patternmakers (secretariat, Fisher and Firkins, 12, Cherry Street, Birmingham 2).
Silica and Moulding Sands Association (secretary, G. K. Timperley, 30, Gordon Street, London, W.C.1).
British Grit Association (secretary, J. Campbell MacGregor, 10, Bank Street, Airdrie, Lanarkshire).
Foundry Coke Merchants Association (secretary, S. Owen, Exchange, Birmingham).
National Federation of Scrap Iron, Steel and Metal Merchants (secretary, L. H. Cryer, 33, Chancery Lane, London, W.C.2).
British Bronze and Brass Ingot Manufacturers' Association (secretariat, Heathcote and Coleman, 69, Harborne Road, Edgbaston, Birmingham, 15).

Technical and Research

Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester 3.
Branches: Australia (Victoria); Birmingham, Coventry and West Midlands; Bristol and West of England; East Midlands; Lancashire; Lincolnshire; London; Newcastle-upon-Tyne; Scottish; Sheffield; Tees-side; Wales and Monmouthshire; West Riding of Yorkshire; South Africa.
Sections: Bedfordshire/Hertfordshire; Coventry and district; East Anglia; Falkirk; North East Lancashire; Northampton and district; Scottish North Eastern; Slough; Southampton; Stoke-on-Trent; West Wales.
British Cast Iron Research Association, Alvechurch, Birmingham, and Scottish laboratories at Blantyre Industrial Estate, Blantyre, Lanarkshire.
British Non-Ferrous Metals Research Association, 81/91, Euston Street, London, N.W.1.
British Steel Castings Research Association, East Bank Road, Sheffield 2.
British Investment Casters' Technical Association (secretary, J. Bolton, East Bank Road, Sheffield 2).
Zinc Alloy Die Casters Association, 34, Berkeley Square, London, W.1.
Institute of Vitreous Enamellers (secretary, J. D. Gardom, Ripley, Derby).

EMPLOYEE ASSOCIATIONS

Amalgamated Union of Foundry Workers of Great Britain and Ireland (incorporating National Union of Foundry Workers, Ironfounding Workers Association, and United Metal Founders Association), 164, Chorlton Road, Brooks's Bar, Manchester 16.

special Committee on Industrial Health, under the guidance of which a special mobile X-ray service has been formed. All workpeople at the risk of respiratory diseases in members' steel foundries can thus have an opportunity of having full-size X-ray plates of their chests taken, the objective being to enable the detection of incipient lung changes at the earliest possible moment. In addition, the Association has developed the Micro-filter respirator, believed to be the most efficient and comfortable prophylactic device of its kind. The Association also organizes periodical conferences of works medical officers.

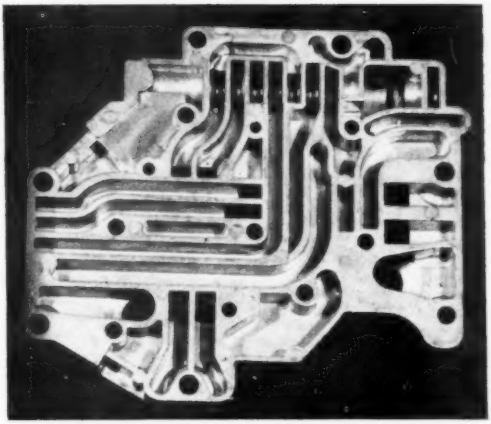
Other aspects of BSFA work include the maintenance of a central statistical and information department, which collates and circulates exclusively to members information relating to the working of the industry, markets, productive capacity, prices, turnover, costs, and other relevant features.

Association of Bronze and Brass Founders

As far as can be ascertained from reliable directories[1], there are about 1,000 foundries in the United Kingdom which produce castings in copper-base non-ferrous metals. As is usual in many countries, these operate from a wide diversity of sizes of establishments and the products themselves are produced sometimes by hand methods and sometimes in highly-mechanized installations. It is currently reported that 80 per cent. of brass and bronze foundries employ fewer than 50 men, but that 90 per cent. of the total annual production tonnage results from the activities of but 200 foundries Similarly, with regard to membership of the manufacturers' association representing this section of the industry, the total membership of the Association of Bronze & Brass Founders (ABBF) at 120 firms is reported to account for over 60 per cent. of the tonnage of castings produced in the very wide range of copper-base alloys commonly used.

The ABBF, like the ironfounders' association, was set up during the 1939-45 war, to act as a corporate committee to represent the interests of brass and bronze founders in negotiation with Government departments. A firm of professional secretaries, Heathcote and Coleman of Birmingham, having an accountancy background, were appointed and constitution and membership rules were drawn up—at the first meeting, 46 of the firms most prominent in brass and bronze founding agreed to become members. Full membership is open to any foundry firm producing castings containing not less than 50 per cent. copper. Each year, a president and vice-president and a Council of 14 are elected from among the members. Sections of the Association operate in London and the Home Counties, Midlands, Scotland, Lancashire and North West, and Yorkshire and North East.

Unlike ironfounding, for brass and bronze founders there is no Government-approved cash levy on ingot metal to support the activities of the Association. Instead, full members of the Association (following a nominal entrance fee) contribute to a common fund established for the purposes of Association work. In addition, there is an associate-member grade, with fewer privileges and reduced subscriptions.



Valve-block casting for Borg-Warner automatic transmission, pressure-die-cast by High Duty Alloys, Limited, Slough, in LM 2M (Hiduminium) alloy. It weighs 3½ lb. and measures approx. 8 in. square.

In brief, the seven main objectives of the ABBF are (*a*) to represent the industry in negotiations with Government departments, in the matter of trade regulations, etc.; (*b*) to render mutual assistance on technical and production problems (inspection procedures, specifications, and raw materials); (*c*) to further the extension of trade in products covered by the Association; (*d*) by co-operative action to avoid uneconomic and wasteful competition; (*e*) to co-operate with similar organizations, and (*f*) to protect the interests of members where and if necessary.

Technical service to members is extremely practical; it ranges from providing instruction and information on shell mounding[2] to formulation of revisions of the cast copper-base specifications (BS 1,400). Metal losses in melting, operating costs in melting, a survey of the CO_2 Process[3], a furnace survey, and the issue of an explanatory handbook to accompany the BS 1,400 specifications, are among other topics in which help and advice have been made available. The ABBF is also represented on the European Committee of Foundry Associations.

Zinc Alloy Die Casters' Association

Although the name suggests that the activities of the Zinc Alloy Die Casters' Association (founded in 1942) are confined to foundries using the die-casting process (and particularly pressure-die-casting) to produce castings in zinc-base alloys, the Association actually has a much broader coverage. Most of its member-firms also die-cast aluminium alloys and some also die-cast the yellow metals, so that it might be said that the Association generally covers most aspects of UK

die-casting—acting on behalf of company members, in conjunction in certain instances with the Light Metal Founders' Association (LMFA), which has itself a die-casting committee.

The purposes of the ZADCA, which like most other UK founders' associations is a non-profit making concern, can be summed up in the words: To promote members' business interests, to co-operate with Government departments and to disseminate technical knowledge. In addition to drawing up rules of good practice, conditions of sale, the Association's objective is also *to consider means to avoid uneconomic competition, but not to endeavour to monopolize trade or commerce in a manner likely to suppress healthy competition or hinder technical progress.*

This last is important, for it represents the present-day status of UK manufacturers' associations, *vis a vis*, the "Monopolies and Restrictive Practices Act" recently introduced into UK legislation. In brief, the Act is designed to prevent grouping of manufacturers having the objective of forming monopolies either on a price or distribution basis, the activities of which are not in the public interest.

So long as a firm has been die-casting zinc alloys for at least three years, it is eligible for membership of the ZADCA, which is itself an offshoot of the Zinc Development Association (ZDA)—an organization maintained by manufacturers of primary zinc metal. Full membership of ZADCA is confined to those UK die-casting firms catering for the general market. Administration of the Association is organized through the joint secretariat of ZDA, housed at 34, Berkeley Square, London, W.1.

The Zinc Alloy Die Casters' Association has two major avenues of service to members. These are (1) the issue of a wide range of publicity (*a*) directed to help members in their technical problems and (*b*) to assist in propagating the sales of castings, (2) introduction of a quality label for members' castings in conjunction with the British Standards Institution—a manifestation of the BSI "Kite Mark" scheme for finished goods certification. Another service—and in this respect also the ZADCA is of help to die-casters generally—is the issue of unified "Conditions of Sale" for use by the trade.

LMFA and NBA

Two further employers' associations serve the interests of the UK non-ferrous foundry industry. These are the Light Metal Founders' Association (LMFA) (which has the services of Heathcote and Coleman of Birmingham for its secretariat), and the National Brassfoundry Association (NBA) with Mr. E. N. Hiley, 4, Calthorpe Road, Five Ways, Edgbaston, Birmingham, as its secretary.

The LMFA naturally serves the general interests of sand founders, gravity-die-casters, and pressure-die-casters of aluminimum and magnesium-base alloys. As the output of these sections of the UK foundry industry (and especially pressure-die-casting) is growing quite rapidly, it is clear that increasing activity can be expected in the employers' association in the future.

The National Brassfoundry Association, which has been in existence over 100 years, is different from other foundry associations in at least two respects, *i.e.*,

Four-blade propeller casting (22 ft. dia.) made in Novoston alloy (high-strength copper-base alloy). The casting is being lifted from its cement/sand mould at the foundry of J. Stone & Company (Charlton), Limited; it weighed 42 tons as cast and 31½ tons as machined ready for fitting to the ship.

Steel casting, weighing 164 *tons, for a rolling-mill housing, cast at the Sheffield steelfoundry of English Steel Castings Corporation. Measuring* 32½ *by* 16 *by* 6½ *ft., it needed* 205 *tons of liquid steel for casting.*

(*1*) In the UK the name "brassfoundry" includes the production of hot-brass-pressings such as plumbers' brassfoundry, gasfittings and the like—in addition to castings made in sand and dies. (*2*) This Association undertakes the responsibility of acting for its membership collectively in negotiations with trade unions, both direct and in concert with the Engineering and Allied Employers' Association.

One of the best-known post-war activities of the NBA was when—in conjunction with the ABBF—it organized a joint Productivity Team to visit selected brassfoundry establishments in the USA. On its return, the team published an extremely valuable report[4] of its findings.

EMPLOYEE ASSOCIATIONS

UK foundry trade-unionism has this year been in continuous existence for 150 years, a remarkable achievement and one of which organized foundry workers are quite proud. In 1943, the Foundry Union then constituted was strengthened by amalgamation with the Scottish Brassmoulders' Union and the Associated Iron, Steel and Brass Dressers of Scotland. At the same time, the constitution was amended to enlarge its organizing forces and to set up machinery through which districts, branches, and rank-and-file members could be brought into more active participation in its affairs. Amalgamation with the Ironfounding Workers' Association and the United Metal Founders' Society in 1946, resulted in the setting up of the present Amalgamated Union of Foundry Workers.

Nowadays, the status of the Union as a responsible negotiating body on wages and conditions of employment is well established and, on the whole, negotiations with employers are carried on in a friendly atmosphere. Here, the employers' negotiating body is, in the main, local branches of the Engineering and Allied Employers' Association (head office, 22, Essex Street, London, W.C.2).

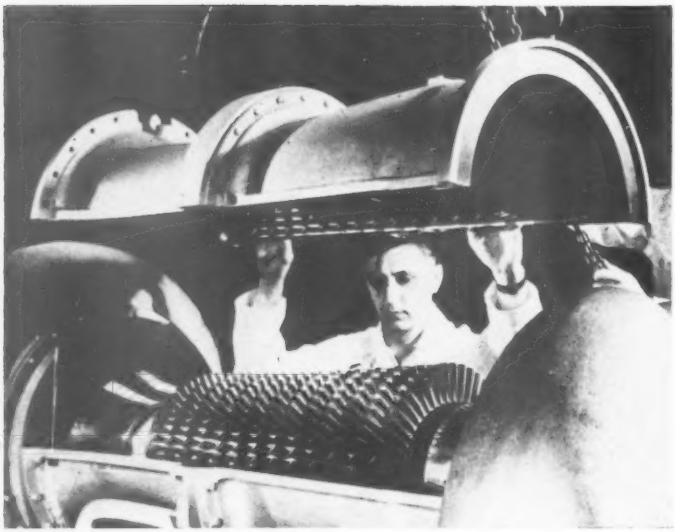
The Union organizes local and general meetings for its members throughout the year and, in addition, holds a "Summer School" for representatives from each district. In addition, periodic visits abroad are made to inspect foundries and assess working conditions in other countries. Recently, a delegation of this type visited foundries in Czechoslovakia. Membership figures for the Amalgamated Union of Foundry Workers are currently quoted as about 72,000.

RESEARCH ASSOCIATIONS

It is proposed next to review the set-up and *modus operandi* of separate research bodies working for the UK foundry industry, not, however, including sponsored work carried out at universities.

British Cast Iron Research Association

One of the first organizations to be set up in the UK to carry out co-operative industrial research on a modern team- or group-basis (following the formation of the Department of Scientific and Industrial Research (DSIR) at the close of the 1914-18 war) was the British Cast Iron Research Association, founded in 1921. It acquired its first laboratory in 1924, but for many years its progress (though fundamentally sound and very worthwhile) was retarded somewhat by lack of funds. In 1940, the BCIRA premises in Birmingham were damaged by enemy action and, in 1942, it moved to its present "home" covering 35,000 sq. ft. at Bordesley Hall, Alvechurch, near Birmingham. Since that period, the Association has grown more rapidly in status and value to the ironfounding industry and now employs about 150 full-time personnel (118 scientifically trained), maintaining also a service laboratory in Scotland. The BCIRA was responsible for the very large amount of basic research which preceded the first announcement to the world—made by the head of its research team, Mr. H. Morrogh, in 1948—of the successful production of as-cast spheroidal-graphite cast-iron. This development, based on small additions of cerium to iron of suitable composition, was quickly followed by news of further successes using magnesium, with the result that a most valuable addition to the "family" of cast metals was created.



Spheroidal - graphite - iron compressor casing for a Ruston & Hornsby gas-turbine engine, produced by Birmidal Developments, Limited.

Finance

Until 1948, the BCIRA was supported by direct contributions from a relatively small number of member-firms amongst the 1,750 or more iron foundries in the country. These total subscriptions were supplemented in the early years by an equal contribution from the country's general taxation revenue, arranged through the DSIR. A major change in financial backing was brought about in 1948 by the Joint Iron Council (JIC) which, acting on behalf of the Council of Ironfoundry Associations (representing ironfounders) and the Council of Iron Producers (representing foundry pig-iron makers) assumed responsibility for paying to the Association a substantial proportion of the funds collected from ironfounders by the Pig-iron Levy. Under this arrangement, the Association now has a total income of the order of £200,000 per annum, and every ironfoundry in the United Kingdom is entitled to full membership.

Services to Industry

The Association functions through four main divisions: (1) Research Department; (2) Development Department; (3) Intelligence Department, and (4) Operational Research Team, the spheres of activity of which are obvious from the titles. In addition to extensive metallurgical, sand research and other process research, the Association has several other important responsibilities to ironfounders. For example, the foundry atmospheres branch of the Development Department of the BCIRA, established in 1951, has been concerned with an industrially applicable method of controlling dust generated at pedestal grinders, and a device is now available commercially. Much work has been done on the ventilation of the foundry knockout, and on many other aspects of improvement in working conditions[5] in relation to that section of the Iron and Steel Foundries Regulations, 1953[6], referring to dust and fumes (in force as from January, 1956).

An Operational Research Team was set up by the Association in 1950 to advise ironfounders on means of improving production efficiency and thereby increasing productivity.

The BCIRA Intelligence Department is responsible for all those services to members that depend on an up-to-date supply of information (including the resources of an excellent library), and is responsible for the preparation of all material published by the Association, including the BCIRA *Journal, Bulletin and Foundry Abstracts,* and its *Journal of Research and Development.*

(*To be continued.*)

REFERENCES

[1] For example, " Rylands Directory of the Coal, Iron, Steel, Tinplate, Hardware, and Allied Trades," published biennially by IRON AND COAL TRADES REVIEW, 17/19, John Adam Street, London, W.C.2.

[2] ABBF, " Interim Report " and " Second Report on the Shell Moulding Process," by J. L. Rice, B.Met. (publication numbers 468 and 476 of the British Non-Ferrous Metals Research Association, 81/91, Euston Street, London, N.W.1).

[3] ABBF, " Survey of the CO_2 Process for Core and Mould Making " (publication number 471 of the BNFMRA).

[4] " The Brass Foundry," published by the Anglo-American Council on Productivity, 21, Tothill Street, London, S.W.1.

[5] " Garrett Report." Report of the Joint Advisory Committee on Conditions in Iron Foundries, published by HM Stationery Office, York House, Kingsway, London, W.C.2.

[6] " Iron and Steel Foundries Regulations, 1953 " (SI 1953/1464), published by HM Stationery Office.

J. A. PRESTWICH INDUSTRIES, LIMITED—Mr. Herbert Clark has retired from the board.

THOMAS BLACKBURN & SONS, LIMITED—Mr. Richard J. Fletcher has been appointed a director.

FERRANTI, LIMITED—Mr. E. Grundy, Mr. J. Prince, and Mr. O. M. Robson have been appointed to the board.

BELMOS COMPANY, LIMITED—Mr. Thomas Coughtrie, chairman and managing director, has resigned from the latter position and is succeeded by Mr. George Coughtrie, his son.

LAYCOCK ENGINEERING, LIMITED—Mr. Kenneth Walker and Mr. Eric Thompson have been appointed joint managing directors of the company, which is a member of the Birfield group.

MATHER & PLATT, LIMITED—Mr. William L. Mather will become chairman on April 1, 1960, in succession to Mr. L. E. Mather, who is to retire from the board on the previous day. Mr. William Mather, who has been a director of the company since 1947, is also a director of Rustyfa, Limited, and member of the committee of the Russo-British Chamber of Commerce.

BSI's Annual General Meeting

At the annual general meeting of the British Standards Institution held in London, Mr. R. E. Huffam was re-elected for a second term of office as the Institution's president. Mr. Huffam who was until his recent retirement, United Kingdom co-ordinating director of Unilever, Limited, also holds office as chairman of BSI's General Council. Also re-elected were the three deputy-presidents of the Institution, Sir Roger Duncalfe; Sir Herbert Manzoni (City Engineer of Birmingham); and Mr. John Ryan (vice-chairman, Metal Box Company, Limited). Among members of BSI's divisional councils elected to serve on the General Council were, from the engineering division, Mr. J. F. Alcock (chairman and managing director, Hunslet Engine Company, Limited), Mr. W. W. Campbell (Merz & McLellan) and Mr. S. E. Goodall (director and chief engineer, W. T. Henley's Telegraph Works, Limited). From the codes of practice division, Mr. H. N. Pemberton (chief engineer surveyor, Lloyd's Register of Shipping) was elected.

Review of the Year

Introducing the BSI's annual report, Mr. Huffam referred to the 1,000 projects for new or revised British Standards now in hand and spoke of the "tremendous and continuing endeavour" going on all the time in BSI's 2,800 technical committees. The number of standards departments in firms was increasing, he said, and the annual conferences of standards engineers were growing in popularity. There was now a strong move to link the activities of such engineers in some form of association.

On the export side he spoke of the desirability of providing translations of British Standards for markets such as those of South America. "We hope that other industries will follow the example of the iron and steel industry which has had prepared in conjunction with BSI a series of summary sheets in five languages of the main steel standards," he added.

Mr. Huffam then highlighted some of the activities in BSI's main technical divisions and *inter alia* he said that in engineering co-ordination and rationalization of the standards for steel and non-ferrous metals were proceeding. Revision of the standards for alloy steel and aluminium pressure vessels was in hand with special attention being paid to the possibility of reducing some of the factors of safety which had been criticized as too high.

He concluded by saying that the Council for codes of practice was making steady progress. An investigation into corrosion of steel structures was to be carried out, and an important draft code on the guarding of machinery had been circulated for comment.

Board Changes

NORTH BRITISH LOCOMOTIVE COMPANY, LIMITED—Mr. Arnold L. G. Lindley has been appointed a director and Mr. J. T. Fleming has resigned from the board.

B.S.A. TOOLS, LIMITED—Mr. S. A. Roberts has been appointed managing director. He joined the company in 1953 as general manager and became deputy managing director in 1956.

WILLIAM BAIRD & COMPANY, LIMITED—Mr. Thomas H. Thorneycroft has been appointed chairman and Mr. James A. Lumsden, of Maclay, Murray & Spens, solicitors, of Glasgow, has been appointed a director.

Management Conference

Many aspects of management will be discussed at the 14th national conference of the British Institute of Management to be held in Harrogate from Tuesday, November 17, to Thursday, November 19. The United States Ambassador, Mr. John Hay Whitney, will open the proceedings and papers will include "Private Enterprise in a 'Family' of Firms" by Mr. Peter Ryder, M.B.E. (managing director, Thomas Tilling, Limited); "Changing Pattern of Consumer Spending" by Dr. Mark Abrams (managing director, Research Services, Limited); "Selection of Senior Staff" by Mr. H. Roff (managing director, Management Selection, Limited) and Mr. B. Ungerson (group personnel manager, Littlewood's Mail Order Stores, Limited); "Reaction of the Trade Unions to Automation" by Mr. J. A. Birch (general secretary, Union of Shop, Distributive and Allied Workers); "Management Approach to Standardization and Simplification" by Mr. H. A. R. Binney (director, British Standards Institution); "Expansion" by Mr. Brian A. Maynard, F.C.A.; "Resistance to Change in a Large-scale Organization" by Mr. C. T. Brunner (a director of Shell-Mex and B.P., Limited); "Second Thoughts on Management Organizations" by Professor Norman C. Hunt, B.COM., PH.D. (Department of Organization of Industry and Commerce, Edinburgh University); "Management and the Human Sciences" by Miss Nancy Seear (London School of Economics); "Employees' Shareholding" by the Right. Hon. Lord Shackleton of Burley (John Lewis & Company, Limited); "The Discriminating Consumer" by Mr. Casper Brook (director, Consumers' Association) and "Production Problems in the Smaller Company" by Mr. B. M. Harris (managing director, Gerard Bros., Limited). Lord Bailleu, president of the Dunlop Rubber Company, will be the speaker at the closing dinner.

Power-Gas Trading Re-organization

Earlier this month, the trading activities of the Power-Gas Corporation, Limited, Stockton-on-Tees, were taken over by two wholly owned subsidiaries, Ashmore, Benson, Pease & Company, the directors of which are Mr. W. R. Brown (chairman), Mr. C. E. Wrangham (vice-chairman), Mr. T. K. Hargreaves (managing director), Mr. C. Robson, Mr. D. M. R. Brown, and Mr. R. P. Key, and which will control the Stockton works, and P. G. Engineering, Limited. The board of the latter company consists of Mr. W. R. Brown (chairman), Mr. C. E. Wrangham (vice-chairman), Mr. R. W. Rutherford (managing director), Mr. P. M. K. Embling (general manager), Mr. C. Robson, Mr. C. Ingham, and Mr. T. H. Riley.

P. G. Engineering will undertake the design and supply of plant and equipment to the chemical, gas, and petroleum industries, and also engineering contracts of a general character.

A NEW COMPANY—Associated Electrical Industries South Africa (Pty.), Limited—will take over the assets and liabilities of the British Thomson-Houston Company (SA) (Pty.), Limited, and Metropolitan-Vickers South Africa (Pty.), Limited, as from November 1. Mr. L. G. Axe, managing director of British Thomson-Houston, and a director of the new parent company, said that the merger and integration resulted from a similar operation in England. Mr. David Stanley, managing director of Metropolitan-Vickers, will be chairman and managing director of the new company.

Company News

E. CHALMERS & COMPANY, LIMITED, non-ferrous scrap-metal merchants and ingot manufacturers, of Edinburgh—A final dividend of 10 per cent. makes 15 (12½) per cent. for the year to August 31, 1959.

H. W. LINDOP & SONS, LIMITED, malleable iron-founders, etc., of Walsall (Staffs)—With a final payment of 20 (16½) per cent., the dividend is held at 23 per cent. Group net profits for the year ended June 30 were £17,445 (£24,844).

CAMBRIDGE INSTRUMENT COMPANY, LIMITED—It is proposed to subdivide the £1 ordinary and unclassified £1 shares in order to bring the nominal value more into line with the general practice of companies engaged in engineering. The subdivision is due to come into operation on October 28.

WILLIAM DOXFORD & SONS, LIMITED, engineers and shipbuilders, of Sunderland—The dividend is raised to 30 (25) per cent., the board considering that the holders should receive some benefit from results of favourable years, leaving future distributions to be determined in the light of prevailing circumstances. Group profits, after tax, were £667,005 (£551,808).

LAKE & ELLIOT, LIMITED, iron and steel founders, of Braintree (Essex)—With a final payment of 10 per cent. the ordinary dividend for the year ended July 31 is 12½ per cent. For 1957-58 an interim of 5 per cent. was followed by a one-for-two scrip issue, and a final of 7½ per cent. was paid on the present capital. Group net profits were £174,977 (£154,146).

WILLIAM SUGG & COMPANY, LIMITED, engineers and non-ferrous founders, of London, S.W.1—A final dividend of 7½ per cent. makes 12½ per cent. for the year ended June 30, 1959, and in addition there is a capital distribution of 2½ (nil) per cent. gross. The total for 1957-58 was 10 per cent., paid as a special interim. Group net profit is £29,328 (net loss of £13,619) after tax of £4,576 (£1,197).

ACROW (ENGINEERS), LIMITED—Turnover for the first six months of the current year exceeded last year, said Mr. W. A. de Vigier, chairman, at last week's meeting in London. Given a continuance of present trading conditions, he said, the current financial year should prove once more to be a record one. "We should, therefore, be able to maintain at least the present dividend on the increased capital," he added.

POLLARD BALL & ROLLER BEARING COMPANY, LIMITED (formerly Ferrybridge Industries, Limited)—The 1959 interim is effectively raised by 1 per cent. to 5 per cent. on the capital as increased by a one-for-four scrip issue. Estimated net profit, before tax, for the six months ended June 30, is £238,000, compared with £165,000 for the same period of 1938. The 1958 total dividend was equivalent to 18 per cent. on the present capital.

HARTLEY & SUGDEN, LIMITED, boilermakers, etc., of Halifax—The offer by F. Francis & Sons (Holdings), Limited, manufacturers of metal containers, etc., of London, S.E.13, for the company's capital has been accepted by holders representing 93.73 per cent. of the preference and 97.55 per cent. of the ordinary and has become unconditional. The remaining shares are to be acquired compulsorily, unless acceptances are received in the meantime.

FORD MOTOR COMPANY, LIMITED—The company is raising its interim from 8.4d. to 1s. per £1 unit for 1959, or from 3½ per cent. to 5 per cent. Including a special interim for the current year, the effective 1958 total was 2s. 4.8d., or 12 per cent. Earnings in the first half of this year exceeded those for the corresponding 1958 period, and group net income of £9,311,270 compares with £6,894,407. The balance for the second half of 1958 was £6,426,151.

MANGANESE BRONZE & BRASS COMPANY, LIMITED—The company has acquired for £303,355 cash all the issued share capital of Redro, Limited, manufacturers of tubular-steel furniture, of Hull, other than its redeemable preference shares, of which £52,250 were outstanding as at March 31, 1959, and which have now been redeemed by that company. Redro group profits before tax, for the year ended March 31, 1959, were £76,698. Net group assets on that date were £240,999.

QUALCAST, LIMITED, light repetition steel and iron founders and lawn-mower manufacturers, of Derby—Order-books are satisfactory and all plants are working to capacity, states the chairman, Mr. J. E. V. Jobson. Output and profits for the year to June 30, 1959, were records, the group net profit being £632,360 (£504,615). The 15 per cent. final dividend on increased capital makes a total equivalent to 26½ per cent. (24 per cent.) on the old capital and 3 per cent. (nil) capital profits distribution.

J. & J. DYSON, LIMITED, makers of refractories, firebricks, ganister, etc., of Sheffield—Following the placing of shares a year ago a dividend of 15 per cent. on the £250,000 ordinary capital is announced for the year to March 31, 1959. Group trading profit is £202,500 (£220,284) and the net profit is £70,982 (£111,008), after depreciation of £35,839 (£25,394) and tax of £68,534 (£82,549). The chairman, Mr. A. Lomas, reports that output is now running at very near pre-recession level.

MORGAN CRUCIBLE COMPANY, LIMITED—It is proposed that the capital of the company be increased to £10,000,000. This will be achieved by the capitalization of £1,762,268 from reserves and the creation of 2,720,000 new "A" ordinary shares of £1 and 280,000 new "B" ordinary shares of £1. These will be converted into "A" and "B" ordinary stock when fully paid. Existing "A" and "B" ordinary stockholders will then receive two units of stock for every five of the same class held on October 1.

A. A. JONES & SHIPMAN, LIMITED, manufacturers of machine and small tools, of Leicester—Profits for the first six months of the current year approximate to the average profits for the whole of last year. In 1958 orders were steadily falling, with November, 1958, as the low point. Since that month there has been an increase of order intake continuing month by month to the present time. The increase in orders is being reflected in increased turnover, and the directors expect that there will be a better profit figure for 1959 than for 1958. Steps have been taken to terminate the losses of the Canadian company and sales procedure in the North American Continent has been drastically reorganized. The interim dividend is 5 (same) per cent.

WINGET, LIMITED, manufacturers of concrete machinery and contractors' plant, of Rochester (Kent)—The chairman, Mr. R. Ducas, believes that the company's prospects for the coming year are brighter than a year ago. He reports that the overall upward trend of orders in the latter part of last year has continued and sales for the first quarter of 1959-60 are up by more than 15 per cent. Referring to the group's expansion, Mr. Ducas states that plans are under consideration requiring an expenditure of over £100,000. Of this sum, about half will be required in the current year. It is expected that this expenditure, together with the additional working capital required for the development of subsidiaries, can be financed from the company's own resources.

Nodular-cast-iron Piston-rings with a Ferritic Matrix

By Traian Dumitrescu and Pascal Popescu*

In contradiction of the normally accepted dictum that piston-ring material should be mainly pearlitic in matrix structure, this article, from a Roumanian source, puts forward a reasoned case for the use of a ferritic matrix, provided the graphite is in the nodular form and the silicon content of the iron is kept relatively high.

Since the purpose of piston rings is to ensure gas-tightness between piston and cylinder, under quite exacting working conditions, the material used for the manufacture of these rings must possess the following physical and mechanical properties: high elasticity, good resistance to wear and corrosion, high mechanical strength, particularly as regards resistance to bending stresses, as well as strength at high temperatures. Due to its structural characteristics and especially to the presence of graphite, grey cast-iron, as compared with other metallic materials, realizes these properties to the greatest extent, which explains its wide use in the manufacture of piston rings.

Background Information

Past experience has shown that, whatever the chemical composition of the cast-iron may be, the best structure for piston rings is a pearlitic/sorbitic one, with phosphide eutectic in a fine network, and with medium-size lamellar graphite, uniformly distributed. Ferrite is an undesirable constituent and, according to standards adopted in Roumania and elsewhere, the limit of it is 10 per cent. in the case of piston rings of good quality[1–6]. To obtain such a structure there are, however, numerous technological difficulties, especially when one is dealing with single-ring and centrifugal pot castings made in metal moulds, on account of the great tendency towards the formation of cementite and undercooled graphite[1-3].

The continuous development of internal combustion engines in recent times—necessitating materials with better physical and mechanical properties, and the finding of new techniques for improving the quality of the materials (especially in the case of piston-ring materials)—has become the constant care of metallurgical engineers. A solution offering improvement of the quality of piston rings used in powerful engines was found in alloying cast-iron with Cr, Ni, Mo, V and W, in various proportions and combinations, according to the loading of the engine[5-7]. The alloying of cast-iron with these elements led to a considerable rise in the quality characteristics of the piston rings. However, in using alloys, the technological difficulties connected with the obtaining of the most adequate structure became even greater instead of less, due to the marked tendency for cementite and undercooled graphite to appear in the structure of the metal.

Early Attempts with Nodular Iron

Recently, attempts have been made to manufacture piston rings from pearlitic nodular cast-iron, because that special material has great elasticity and a good resistance to wear, mainly on account of the shape in which the graphite appears. Research work carried out so far has shown that, apart from their usual characteristics, piston rings made of nodular cast-iron have the disadvantage that the stability of their properties is rather reduced at the temperatures prevailing in the cylinder, and that the only possible way of improving the quality of these piston rings is the alloying of the cast-iron with Cr, Mo, V, or W[8].

It should be pointed out that the presence of magnesium in such cast-iron favours considerably the formation of cementite and, under the casting-conditions of piston-rings, increases the difficulty of obtaining a pearlitic structure. It is therefore obvious that these difficulties will increase when the action of magnesium is accompanied by a similar action of chromium, molybdenum, vanadium and tungsten.

Likewise, bearing in mind the great variety of pearlite/cementite structures obtained in the casting process and the marked tendency of ferrite to precipitate in annealed nodular-graphite cast-iron, it is rather difficult to see how such structures, in the case of piston-rings, can be corrected by heat-treatment under industrial conditions.

Modified Viewpoint

In order to avoid the inconveniences connected with the obtaining of pearlitic structure, but still to use the advantages of the nodular form of graphite, the present Authors, basing their ideas on a previous research[9], envisaged the possibility of utilizing in the manufacture of piston rings a ferritic nodular cast-iron, alloyed with 4 to 5 per cent. silicon. The main characteristics of such a cast-iron are its excellent structural stability at high temperatures, its great resistance to oxidation and corrosion, and its great elasticity.

The fairly high hardness of such cast-irons, lying within the limits required for piston rings, as well as the strain-hardening capacity of alloyed

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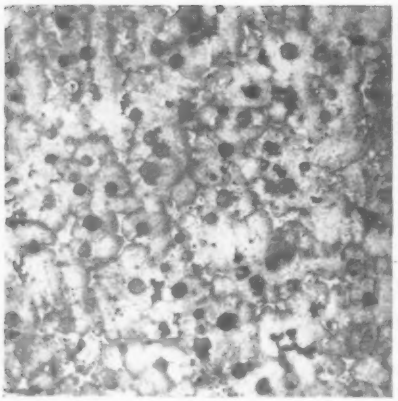

FIG. 1.—*Photomicrograph of the etched structure of iron No.* 1 *in Table* 1 *(pearlitic nodular-graphite iron).*

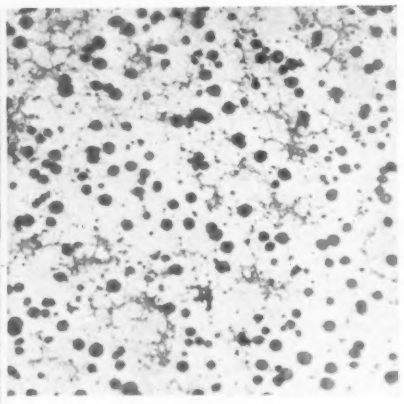

FIG. 2.—*Etched structure of iron No.* 3 *(see Table* 1*); this matrix is mainly ferritic in structure.*

ferrite, led the Authors to the assumption that nodular-graphite cast-iron with 4 to 5 per cent. silicon would still have a good resistance to wear. However, this quality of the new material was the main unknown factor to be investigated. On the other hand, the presence of a large proportion of silicon made it certain that the difficulties caused by the separation of cementite, or by its decomposition by heat-treatment, would be completely overcome. These considerations, therefore, were the principal elements which encouraged the Authors to make an attempt to use a ferritic nodular cast-iron in the manufacture of piston rings.

Experimental Conditions

The cast iron was melted and alloyed in an acid electric furnace, under a neutral slag made up from quartz sand, lime and bauxite. As alloy, ferro-silicon containing 75 per cent. Si was used. The molten iron, at 1,400 to 1,450 deg. C., was inoculated with metallic magnesium, in the proportion of 0.7 per cent. The magnesium was introduced with the aid of a plunger having perforations on its lateral sides, in the interior of a specially arranged capsule. For modification 0.5 per cent. of 75-per cent. ferro-silicon was used.

Casting was effected centrifugally, by horizontal machines, using metal moulds lined with a refractory wash, sand and ferro-silicon powder. Pot castings were produced of 137-mm., i.d; 170 to 180-mm., o.d., and 240-mm. long. Immediately after casting, they were placed into a furnace heated to 850 deg. C., maintained at that temperature for three hours and then left to cool in the furnace. The pots in which it was desired to obtain a pearlitic structure were air cooled after casting. As the hardness of these was too great, they were later annealed for one hour at 700 deg. C., followed by cooling by air. The hardness of the bushes varied between 240 and 270 Brinell. After the usual turning and fininshing operations, the authors obtained compression, scraper and oil-retaining rings with a diameter of 160 mm., for a 2,000-h.p. type M42 aero-engine.

Chemical Composition

As is shown by Table 1, the silicon contents of the cast-irons vary mainly between 3.80 and 5.22 per cent., the small variations in manganese and phosphorus contents being due to the fact that there were two different charges. The diminution of the carbon content is due to the decrease of carbon solubility as silicon content increases.

TABLE 1.—*Percentage Compositions of Nodular-graphite Cast-irons used for Tests.*

Sample No.	C.	Si.	Mn.	S.	P.	Mg.	Charge No.
1	3.16	3.80	0.71	trace	0.52	0.069	1
2	3.00	4.00	1.04	,,	0.45	0.075	2
3	2.92	4.27	1.04	,,	0.47	0.084	2
4	2.79	4.42	1.00	,,	0.46	0.088	2
5	2.78	4.56	0.70	,,	0.55	0.120	1
6	2.70	5.22	0.72	,,	0.53	0.110	1

Microstructures

As test-pieces for the study of microstructure, rings cut from the top and bottom of the pots, at a distance of 25 mm. from the edge, were used. As shown by Fig. 1, the microstructure of cast-iron No. 1 consisted of graphite nodules, sorbitic pearlitic and phosphide eutectic in a fine network. The microstructures of the cast-irons Nos. 2 to 6 consist of graphite nodules, ferrite in equiaxial crystals of different sizes and phosphide eutectic in a fine network, the structure of iron No. 3 being shown in Fig. 2.

Piston rings made of the nodular cast-iron were studied in parallel with those commonly used in the aero-engine M42. The latter are made out of alloyed cast-iron having the following composition: C, 2.9 to 3.2; Si, 1.4 to 1.9; Mn, 0.7 to 1.2; Cr, 0.3 to 0.6; Ni, 0.8 to 1.6; P, 0.4 to 0.6; W, 0.15 to 0.6; Mo, 0.05 to 0.2 per cent. Their microstructure consists of thin graphite flakes uniformly distributed, fine lamellar pearlite and phosphide eutectic in a fine network. Their hardness varies between 97 and 107 Rockwell, B scale.

Springing of the Rings

Tests of the springiness of rings were carried out by annealing the samples at a quite low temperature, followed by oil quenching. The opening of the gap and the conditions of treatment are shown in Table 2, from which it will be observed that the elasticity of piston rings made of ferritic nodular cast-iron is greater than that of pearlitic

TABLE 2.—*Test Results for Determining Opening Conditions of the Gap*

Type of ring.	Gap opening (mm.).		Annealing temperature (deg. C.)	Duration of annealing (min.)	Cooling medium.
	Before treatment.	After treatment.			
Pearlitic grey cast-iron alloyed with Cr, Ni, Mo and W..	29	18 to 19	620	30	oil
Pearlitic nodular iron	20	17	620	30	,,
Ferritic nodular iron	13 to 16	13 to 16	680	60	,,

cast-iron piston rings alloyed with Cr, Ni, Mo and W, or of pearlitic nodular cast iron. Thus, in order to obtain the same degree of tension, the gap in ferritic nodular cast-iron piston rings can be kept smaller than gaps of other piston rings, particularly in those made of alloyed cast-iron.

The fact that piston rings made of ferritic nodular cast-iron have a gap with a small opening is an advantage, because they are then subject to a smaller bending stress under working conditions,

By further examination of the Table 2 it can be seen that the piston rings with a pearlitic structure, particularly those made of cast iron alloyed with Cr, Ni, Mo and W, are left with fairly large residual internal stresses, as is revealed by the smaller opening after heat-treatment. Under working conditions, such stresses lead to a decrease in, and uneven distribution of, the pressure upon the cylinder walls. It is not possible to have the opening made at higher temperatures, so as to make these stresses disappear completely, because at higher temperatures structural modifications take place and at the same time the material loses some of its hardness and elasticity. From Table 2, it appears, however, that such a treatment can be applied satisfactorily to piston rings made of ferritic nodular cast-iron, because structural modifications and, consequently, a decrease in hardness or other physical and mechanical characteristics, are no longer factors.

Hardness and Stability

The hardness of piston rings made of pearlitic nodular cast-iron was 95 Rockwell B, while that of ferritic nodular cast-iron piston rings varied between 93 and 103 Rockwell B, according to the silicon content.

To check stability at high temperatures, piston rings introduced in to a cylinder lining of engine M42 were heated up to 500 deg. C., and maintained for 10 hr. at that temperature. The stability of the physical and mechanical characteristics was ascertained by measuring the tension, and the size of the gaps, before and after treatment. Surveying the data shown in Table 3 it would appear that, as regards the stability of physical and mechanical properties at high temperatures, there is small difference between piston-rings of cast iron alloyed with Cr, Ni, Mo and W, and those of pearlitic nodular cast-iron. On the other hand, piston rings of ferritic nodular cast-iron are superior to those with a pearlitic structure, their physical characteristics being at least three times as stable.

The maintenance of tension and of the opening in piston rings made of ferritic nodular graphite cast-iron, at values close to the original values, is, to a great extent, due to a complete absence of internal stresses. The stability of physical and mechanical characteristics of these piston rings is, however, determined by the rigidity of the crystal lattice of the Fe/Si solid solution, and the absence of structural changes in the temperatures range between 20 and 900 deg. C.

Resistance to Wear

Wear resistance was determined by testing the piston rings in a 12-cylinder, 2,000-h.p., water-cooled M42 aero-engine. Piston rings of nodular cast-iron were mounted on the pistons on the left-hand side of the cylinder block. Each piston had rings of the same, or a very similar, chemical composition. Cast-iron piston-rings alloyed with Cr, Ni, Mo and W were mounted on the pistons on the right-hand side. The test was completed in three stages, each consisting of running-in, adjustment, idling and endurance cycles. The test lasted 119 hr. 30 min. and the resistance to wear was determined by measuring the thickness, the opening of the gap, and the weight of the piston rings before and after the test. In Table 4 are set out the results obtained, expressed as the decrease of thickness, the widening of the opening due to the wear of the peripheral

TABLE 3.—*Variations in Tension and in Opening of Gap as a result of a 10-hr. Annealing Test of Rings under Compression (at 500 deg. C.).*

Type of ring.	Diametrical tension of rings.		Loss in tension.		Gap.				Remarks.
							Reduction.		
	Initial load (gm.)	Final load (gm.)	(gm.)	(per cent.)	Initial (mm.)	Final (mm.)	(mm.)	(per cent.)	
Pearlitic grey cast-iron, alloyed with Cr, Ni, Mo and W ..	5,050	2,020	3,030	60	21.50	7.90	13.60	63.00	Average values for five rings
Pearlitic nodular iron	5,800	2,575	3,225	56	17.75	7.00	10.75	61.00	Average values for two rings
Ferritic nodular iron	5,050	4,130	920	18	14.66	11.61	3.05	20.80	Average values for nine rings

surface on the cylinder walls, and the loss in weight of the rings. An analysis of the data presented

(1) Piston rings made of ferritic nodular cast-iron have greater elasticity than those made from alloyed flake-graphite iron, or even of those made from pearlitic nodular iron.

TABLE 4.—*Results of Piston-ring Tests on a 2,000-h.p. Aero-engine, duration 119 hr. 30 min.*

Type of piston ring.	Purpose and position of the rings.	Wear thickness		Opening of the gap		Loss of weight		Variation in tension		Number of tests on which results are based.
		(mm.)	(per cent.)	(mm.)	(per cent.)	(gm.)	(per cent.)	(gm.)	(per cent.)	
Pearlitic cast-iron alloyed with Cr, Ni, Mo and W	Compression									
	Upper	0.034	1.470	0.116	23.20	0.57	1.275	−775	−14.15	Six
	Lower	0.020	0.870	0.067	12.50	0.17	0.375	−300	− 5.40	Six
	Scraper	0.020	0.872	0.144	34.10	0.12	0.271	−122	− 2.29	Eighteen
	Oil-retainer	0.019	0.356	0.230	4.10	0:07	0.163	−125	− 2.68	Twelve
Pearlitic nodular cast-iron	Compression									
	Upper	0.020	0.862	0.200	40.00	0.66	1.540	−1,400	−24.10	One
	Lower	0.010	0.435	0.000	0.00	0.07	0.160	−400	− 7.40	One
	Scraper	0.010	0.435	0.050	11.10	0.06	0.140	−25	− 0.44	Two
Ferritic nodular cast-iron	Compression									
	Upper	0.018	0.784	0.040	7.00	0.31	0.726	−270	− 5.6	Five
	Lower	0.009	0.391	0.060	11.30	0.15	0.360	−200*	− 4.31	Five
	Scraper	0.007	0.306	0.075	14.56	0.15	0.349	−112	− 2.22	Ten
								+350	+ 7.86*	
	Oil-retainer	0.024	0.450	0.300	5.33	0.14	0.342	−31	− 0.56	Ten
								+50	+ 1.12*	

* Value for one ring.

shows that the wear resistance of piston rings made of alloyed cast-iron, and of those made of pearlitic nodular cast-iron, is lower than that of the ferritic nodular cast-iron piston-rings.

Variation of Tension

The data in Table 4, referring to the variations of the diametrical tension in the course of the test in the motor, demonstrate once more the much superior qualities of piston rings made of ferritic nodular cast-iron. The increased tension observed in some piston rings made of ferritic nodular cast-iron is, in the Authors' opinion, due to the strain-hardening of the material on the friction surfaces of the piston ring. This strain-hardening phenomenon is widely supposed to be responsible for the increased resistance to wear of the Fe/Si solid solution.

Cylinder Wear

In the same series of tests, cylinder wear was determined by measuring the cylinder diameters at the upper "dead" point (in the direction of movement, and in a direction perpendicular to it) at the beginning and end of the test. The least wear, equal to 0.02 to 0.05 mm., occurred in the case of piston rings of ferritic nodular cast-iron. A greater wear (0.08 mm.) was produced by piston rings of pearlitic nodular cast-iron, while the greatest wear (0.04 to 0.12 mm.) was caused by piston rings made of alloyed cast-iron.

Conclusions

The experiments with piston rings of nodular cast-iron, and the analysis of their characteristics compared with those of cast-iron piston rings alloyed with Cr, Ni, Mo and W, as well as experience gained in the manufacture of alloyed cast-iron piston rings, have allowed the Authors to reach the following conclusions:

(2) The hardness of piston rings made of ferritic nodular cast-iron represents the lower limit in the scale of hardness admissible for that kind of iron, and consequently cannot decrease following an annealing treatment, even at high temperatures.

(3) Piston rings made of ferritic nodular cast-iron have no internal stresses whatever, in contrast to piston rings of pearlitic, alloyed, or of nodular-graphite iron.

(4) Piston rings made of ferritic nodular cast-iron maintain their physical and mechanical properties at high temperatures to a much greater extent than piston rings made of pearlitic cast-iron, alloyed, or made from nodular-graphite iron.

(5) The resistance to wear of ferritic nodular cast-iron piston rings (as manifested by the reduction of thickness, the widening of the gaps, and loss in weight during the 119-hr. test with a 2,000-h.p. aero-engine) is superior to that of rings made from the other materials.

(6) Piston rings of ferritic nodular-graphite cast-iron produce less wear in cylinder liners.

(7) The production technology of piston rings made of ferritic nodular cast-iron is simpler, because not only does the charge require only a single addition element for the alloy (with a comparatively low melting point and great solubility in iron), but also the presence of 4 to 5 per cent. silicon prevents the formation of cementite, even in individual casting of piston rings.

(8) Using as an alloy only the cheap and easily procurable silicon, and casting without rejects (because unsuitable structures can be avoided), and being able also to cast individual rings, means that the cost of piston rings of ferritic nodular cast-iron can be kept below that of pearlitic cast-iron piston rings, alloyed, or with nodular-graphite.

The above technical and economic advantages, inherent in piston rings made of ferritic nodular

cast-iron are, in the Authors' opinion, powerful arguments in favour of their large-scale adoption.

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Delta Metal Preference Consolidation

Giving shareholders particulars of a preference consolidation scheme, Mr. W. E. Ogden, chairman of the Delta Metal Company, Limited, London, S.E.10, reports that output and profit for the first nine months of 1959 exceed the corresponding 1958 period.

The preference scheme involves the creation of a new class of 6 per cent. cumulative preference shares, and holders in the five subsidiaries—Elkington & Company, Limited, J. W. Singer & Sons, Limited, James Booth & Company, Limited, Sanbra, Limited, and E. P. Jenks, Limited—will, subject to approval, be invited to exchange their holdings (all 6 per cent. preference) on a par basis. The James Booth & Company 7 per cent. preference holders will be offered one extra share for every six, as compensation for a reduction in the dividend rate.

Total preference capital of the subsidiaries concerned amounts to £590,000 of which the group holds £38,748. Assuming full acceptance the total number of preference shares to be issued will be 577,919. The gross annual dividend will be unchanged at £34,675.

Metal Closures/John Dale Merger Proposal

Negotiations between the boards of Metal Closures, Limited, manufacturers of bottle-sealing machines, etc., of West Bromwich (Staffs), and John Dale, Limited, manufacturers of non-ferrous collapsible tubes, aluminium and light-alloy castings, etc., of London, N.11, are in progress with a view to a merger of their business interests. There have been close trading associations between the two companies for many years. It is expected that the merger proposals will be sent to shareholders next week.

An offer of 19s. for the ordinary shares of the West Bromwich company has been made on behalf of a third party, Winterbottom Industries, but shareholders are advised to take no action on this until they receive details of the merger terms and the directors' recommendations.

RECENTLY AT THE LETCHWORTH WORKS of K & L Steelfounders & Engineers, Limited, a member of the George Cohen 600 Group, Limited, the 1,000th Jones KL 66 crane to be built there by the company was handed over to the National Coal Board by Mr. Frank Rowe, managing director of the company.

Industrial Psychology Grant increased

Annual grant to the National Institute of Industrial Psychology is to be continued by the Department of Scientific and Industrial Research for a further five years.

The amount is to be raised from £4,000 to £6,000 a year on the understanding that the Institute will increase to £9,000 a year its own income from membership subscriptions and special contributions for long-term research. Up to now, the DSIR has provided £4,000 if the Institute raised a like sum from these sources. The DSIR is also to add another £100 a year for every £100 of grant-earning income which the Institute can obtain in excess of the qualifying £9,000, up to a maximum of another £6,000 a year. Previously the maximum was £4,000 for income in excess of £4,000. This means that if the Institute can raise £15,000 a year from industry the Government will give it £12,000. The grant and the grant-earning income have to be put in a special fund and used only for long-term research. The DSIR grants began for a three-year trial period in October, 1956. Last year, the Institute received the maximum (under the old arrangements) of £8,000. Most of the grant-earning income comes from industrial firms, who contribute as corporate members of the institute.

Among research projects now in train are an inquiry into workers' attitudes to the opportunities and rewards offered by their jobs which may have a bearing on personnel policies; an investigation into the relation between satisfaction and efficiency on the job; a study of industrial management structure and efficiency and experiments on tests for manual skills. The Institute has received many inquiries from industry recently about the special tests it has devised for selecting suitable school-leavers to be engineering apprentices.

The Institute is embarking on its usual series of autumn and winter courses for personnel officers and others in such subjects as interviewing, intelligence testing, and vocational guidance. A new departure this year is an introductory course on assessing and selecting people for jobs to serve as background for those who later attend one of the more detailed courses.

C & G Foundrywork Awards

The following prizes offered on behalf of the Institute of British Foundrymen were awarded to successful candidates in the City and Guilds examinations in patternmaking and foundry practice held in 1959:

Buchanan Silver Medal: Foundry practice—advanced: James L. May, of Bristol.

Buchanan Prizes: Patternmaking—final: Robert Frost, of Altrincham, and David J. S. Skinner, of Dundee. Foundry practice—final: Alan M. Croft, of Leyland (Lancs), and David Adam, of Bannockburn.

The *P. H. Wilson Prizes*—established by the late Mr. P. H. Wilson, O.B.E., a past-president of the Institute—for successes in the ordinary examinations, were awarded as follow: *Patternmaking:* First prize to John Y. Strathern, Clyde Bank, Glasgow, and second to Colin R. Sullings, Ipswich. *Foundry Practice:* First prize, John Fraser, Carluke, Lanarkshire, and second prize, Hugh P. Williams, Sheffield.

Mr. E. H. ROGERSON, who was for 33 years manager in Scotland for Cochran & Company, Annan, Limited, boilermakers and engineers, of Annan (Dumfriesshire), was given a dinner in Glasgow recently, by representatives of the engineering industry on the occasion of his retirement.

Obligation to fence Dangerous Machinery

By "Barrister-at-Law"

The nature and extent of the statutory obligation imposed on employers by the Factories Act to fence dangerous machinery was the subject of a judgment in a recent case, the findings of which could apply equally well to circumstances which might arise in foundries.

Section 14 of the Factories Act, 1937, requires every dangerous part of any machinery to be securely fenced. It is provided by s. 133 of the Act that, if any person suffers bodily injury in consequence of the occupier of a factory having contravened any provision of the Act, the occupier is to be liable to a fine not exceeding £100. According to a proviso to s. 133 however (proviso (aI), in the case of injury to health, the occupier is not to be liable to a fine, unless the injury was caused *directly by contravention* of the Act. Among the points raised in Dunn *vs* Birds Eye Foods, Limited, were the questions: whether the Act imposed an absolute obligation on the occupier to fence, and whether any responsibility would rest on the occupier where the accident was due to the employee's own fault. The Court was further called upon to consider the meaning of the words "injury to health" in the above proviso.

Material Facts

The material facts of this case were briefly as follow:—

The employee in question was engaged as a general labourer in the sanitation shift, and was engaged in cleaning a belt conveyor (which ran over a drum) alongside a row of snipping machines when the accident happened. The drum and belt, which could have been securely fenced by a fixed guard, were unfenced at the time in question. While there was no danger to the operator when operating the machine, there was some risk if it was left in motion while it was being cleaned. Contrary to instructions, the employee was cleaning the machinery with his hands without having switched it off, and he had neglected to do so apparently to save himself the trouble of walking to the switch. His hand was caught in the machinery while it was thus in motion, and was badly lacerated. The accident was therefore his own fault.

"In Consequence"

Was the injury "in consequence" of the failure to fence?

In these circumstances, could it be said that the injury had been occasioned "in consequence of" the occupier's failure to fence the machinery, so as to render the occupier liable?

At first sight it would appear that the accident could not have been said to have occurred *in consequence of* the failure to fence—since the accident was the employee's own fault. Even if there had been a guard, the employee would have removed the guard and proceeded to clean the machinery while it was still in motion. However, the Court declined to accept this view. The Act, in their opinion, placed an absolute obligation on the occupier to fence. Had there been a fence the accident, in the opinion of the Court, would not have happened. Accordingly, it could be said that the accident was in consequence of the occupier's contravention of the Act in failing to fence.

"Caused Directly"

Was the injury "caused directly" by the contravention?

It was then argued that, even assuming that the accident was "in consequence of" the failure to fence, it was not "caused directly" by such failure, so that the occupiers were not liable to a penalty. The Court conceded that, even if the failure to fence was a "cause" of any "injury to health," the occupier would not be liable unless it was also a "direct cause" of such "injury to health," for the occupier would, in such circumstances, be saved by the above proviso (a) S.133). But the Court held that the words *injury to health* in the proviso were meant to cover *diseases* which a workman might suffer because of a breach of the Act, as a result of dust, for instance, and that the words did not apply to an injury caused by an accident (such as a mutilated hand for instance) as in this case.

Accordingly, the occupiers of the factory were not entitled to pray in aid the above proviso (a), and were held liable for the contravention of the Act in failing to fence the machinery.

Italian Subsidiary for Allis-Chalmers

Establishment of Allis-Chalmers Italiana S.p.A., a majority-owned subsidiary of Allis-Chalmers Manufacturing Company, Milwaukee, USA, and the acquisition by the Italian company of the facilities of Vender S.p.A., manufacturers of crawler tractors and spare parts, of Cusano, Milan, is announced. Vender retain a substantial share in the new company. The new plant, which produces crawler tractors powered by diesel engines ranging from 60 to 325 h.p., bulldozers, shovels, and other related equipment, will enable Allis-Chalmers to give improved service to western European countries and Britain. The tractors, etc., will be marketed through the present Allis-Chalmers International dealer organization. Mackay Industrial Equipment, Limited, Feltham (Middx), is the Allis-Chalmers UK industrial distributor.

Development at Holman Headquarters

Holman Brothers, Limited, following integration with Climax Rock Drill & Engineering, Limited, have underlined the value of this part of their production by the construction of a completely up-to-date metallurgical control and heat-treatment department at their headquarters in Camborne, Cornwall. This centralization of metallurgical research, control and heat-treatment has already resulted in greatly increased efficiency and a significant speed-up in production. The new department, with a floor area of 17,000 sq. ft., contains metallurgical, physical and chemical laboratories, and high-speed, tool-steel, piston and general heat-treatment sections (see Fig. 1). All kinds of day-to-day problems are tackled, such as the machinability problems that periodically confront the man on the shop floor, etc. Metals are analysed, and routine metallographic examinations carried out. The heat-treatment of high-speed steels, highly-alloyed steels and tool steels is carried out in Birlec, GEC, and EFCO batch-type furnaces, Birlec forced-air circulating tempering furnaces, Birlec-Cassel salt-bath furnaces, and Shorterizing equipment. Also included in the section are machines for vapour-blasting, shot-peening and shotblasting. Heat-treatment of constructional case-hardening steel is carried out by operations involving annealing, normalizing, carburizing, hardening and tempering. Equipment in this section includes Wild-Barfield drip-feed gas carburizers, EFCO salt-bath furnaces, Birlec 110-kw pack carburizing furnaces and various types of oil-quenching machinery. Spencer Halstead rotary shot-blast equipment is used for general shotblasting operations.

FIG. 1.—*Part of the new heat-treatment department at the headquarters of Holman Brothers, Limited, at Camborne. In the illustration, rock-drill parts from the furnace in the background are being quenched in oil, following heating in a Birlec furnace.*

Industrial Safety Conference

The annual conference of the Institution of Industrial Safety Officers will be held this year at the Grand Hotel, Brighton from November 6 to 8. It will open with a dinner on the Friday evening preceded by the annual general meeting of the Institution at which officials for the ensuing year will be elected.

The working sessions of the conference will be based on the theme "Education and Training Techniques for Safety." During the opening session on Saturday morning, the framework of a safety course for supervisors will be discussed by representatives from different types of industry, and the Saturday afternoon sessions will include one in which new industrial safety films will be shown and discussed. In the evening, a paper on "Training Support and Visual Aids" will be presented jointly by Mr. B. A. Inshaw, head of the Industrial Safety Division of the Royal Society for the Prevention of Accidents, and Mr. B. L. Cornford, division safety officer, plastics division, Imperial Chemical Industries Limited. A quantity of visual training aids will be on display for the benefit of delegates.

The conference will end at lunchtime on the Sunday, after a paper entitled "Winning Support by the Spoken Word" presented by Mr. Rex Roberts, Imperial Chemical Industries, Limited.

Steel Plants in India

Preliminary opinions in official Indian Government circles indicate that the expansion of the three new steel plants may take precedence over the establishment of a fourth plant at Bokaro. The present view is that ingot capacity should be increased from 6,000,000 tons (1961) to 10,000,000 tons of steel by the end of the Third Plan period.

The size of the steel output, its composition and the phasing of expansion of the existing units will, however, depend on the completion of studies setting out the country's requirements in terms of finished products. The pattern of demand will also determine the type of end products for which the Bokaro unit should be designed.

The preparation of a preliminary project report for the proposed Bokaro plant has already been entrusted to a firm of Indian consultants. Hindustan Steel, Limited, has also set up the nucleus of a central design office at Rourkela.

The heavy machine building plant and the heavy forge and foundry shop at Ranchi, and the heavy electrical equipment plant at Bhopal will all start production during the Third Plan period and will be in a position to begin the supply of equipment for part of the contemplated steel expansion programme.

Equipment and Supplies

Lifting "Dogs"

Lifting Gear Products (Engineering), Limited, Petre Street, Sheffield, 4, have produced lifting "dogs" (see Fig. 1) of Patent design to take the place of old-fashioned "home-made" dogs, which are often badly designed, roughly made and in many cases dangerous to life and limb. The new dogs (Goliath Universal) incorporate a special chain-compensating arrangement, which enables the dogs to be used when pulling off centre, and which ensures that a tight grip is maintained from any angle. This feature helps considerably when awkward-lying materials have to be shifted, as for example, when billets or bars are roughly stacked in a confined space. The chisel points of the dogs are stellited for long life, and designed with an ample margin of safety, each one being tested to comply with the 1937 Factories Act—a test certificate is supplied. The chain-sling assembly is of hardened and tempered all-steel construction to BSS. 2902, with chain to BSS.1663. Each size of dog can handle a wide range of material. (The dogs are the subject of a Patent application, and all rights are reserved.)

Backings for Welds

A patent* recently published in the name of Midland Silicones, Limited, 68, Knightsbridge, London, S.W.1, describes the use of silicone pressure-sensitive materials in welding. A weld-backing assembly, consisting of glass cloth impregnated and coated with a silicone pressure-sensitive adhesive, to which is attached a flexible steel-tape on one side, firmly adheres to the work places. After welding, the weld backing is easily stripped away and the residual ash brushed off. It is claimed that an excellent smooth weld is produced, and no grinding off of excess material is needed. Other assemblies are described, including one comprising alternate layers of heavy aluminium foil and pressure-sensitive silicone adhesive. It is thought that the inventions will be particularly applicable where irregularly shaped and curved surfaces or pipe-like castings are to be welded.

* British Patent No. 817699.

FIG. 1.—*Lifting "dogs" designed by Lifting Gear Products (Engineering), Limited, of Sheffield. They are shown here lifting a 1½-ton ingot.*

Cutting-off Machine

Bramcut, Limited, 155, Charles Street, Leicester, are now manufacturing a cutting-off machine designed for use in the non-ferrous foundry. The cutter (Fig. 2) is mounted on a strong fabricated pedestal, which carries a drawer to catch the metal dust (this aids in the separation of swarf from different alloys). The machine has a 16-in. cutting wheel, and attachments may be incorporated to catch the finer dust by means of an extraction fan and bag. A 3-h.p. motor belt drives the wheel—the belt being so tensioned that, in case of jamming, it will slip before the wheel can break. Two speeds are available, the higher for aluminium, the lower for bronze alloys and high-tensile brasses.

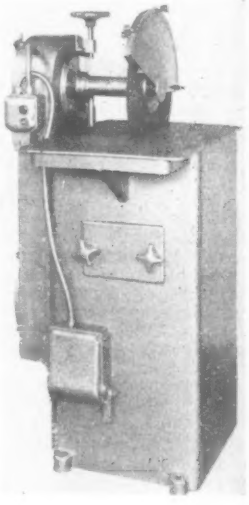

FIG. 2.—*Cutting-off machine for non-ferrous alloys, manufactured by Bramcut, Limited, of Leicester.*

Courses on Temperature Control

West Instrument, Limited, manufacturers of temperature-control instruments, are to give courses of instruction of one day's duration on the saturable core-reactor type of temperature-control instrument. The first two of these were held on October 14 and 15 at the company's London office. The core-reactor forms the basis of the stepless temperature controller, an instrument claimed to be superior to both the on/off and time-cycling proportioning controllers. It is reported that these controllers are used extensively in furnace operation. Readers who are interested should write to Mr. James Hartnett, West Instrument, Limited, 52, Regent Street, Brighton, 1, Sussex.

Birlec re-style their Box-furnaces

Birlec, Limited, Erdington, Birmingham, have re-styled their standard box-furnaces, to improve appearance, rationalize manufacture, and reduce prices. Specially designed to give temperature uniformity across the full hearth width, the new GP furnaces are built for two temperature ranges: (a) up to 1,000 deg. C.; ranging in capacity from 1.5 to 26 cub. ft. (20-70 kw. ratings), and (b) up to 1,400 deg. C., from ¼ to 3 cub. ft. capacity (16-60 kw. ratings). The counter-balanced furnace doors are hand-wheel operated, power operation being sold as an optional extra. The heating elements are automatically isolated from the power supply when the door is opened, the double-wound, open-type transformer being housed in the lower

furnace casing. A separate control cubicle is incorporated for each furnace, and a gas-inlet connection is provided at the rear of the heating chamber for admitting protective atmosphere when required. In the GP.1,000 range, the three smaller sizes have resistance elements supported in the side walls by specially formed refractories—in the two larger sizes the elements are supported from the roof by nickel-chromium alloy hooks mounted in the refractory. All the furnaces incorporate a heating element on the inner face of the door, continuously energized from a separate tap transformer to provide compensation for door losses, and have cast nickel-chromium alloy hearth-plates with side flanges to retain the work. For exceptionally heavy work, such as the heat-treatment of castings, the two largest sizes can be supplied with a hearth of hard refractory brick. Furnaces of the G.P.1,400 range are heated by silicon-carbide rods mounted transversely above and below the hearth, the flanged sided hearth plates being also made of silicon carbide.

Shot-blaster's Helmet

British Shot Blast & Engineering Company, Limited, 772, Chester Road, Stretford (Lancs), have designed the new type of moulded-rubber shotblast helmet shown in Fig. 3. Cleanliness, durability and strength, with all parts replaceable, are features claimed. The helmet is moulded in ¼ in. thick material and has a detachable rubber outer apron, with a calico inner apron to tie up round the operator's neckline. The apron can be exchanged when required, by undoing 12 screws, and replaced by a new cover which can be kept in stock, thus eliminating the necessity of having to send the helmet away for repairs, or keeping some spare helmets in stock for replacement. The air connection has been designed with an "eye" on top, so that the helmet can be hung up instead of being left about on the floor of the shotblast room.

The helmet can be trodden on without damage except to the eyeshield which is replaceable. The head bandeau inside the helmet is attached by the air connection, and can be taken out by undoing the locking nut, and the helmet cleaned with a good antiseptic. A rubber band around the top of the eyeshield forms a double guard against shot getting behind the eyeshield and into the operator's eyes. Chains and hooks are attached to the apron and fit under the armpits of the operator, keeping the helmet steady on the head even when the user is bending down. The equipment carries the Chief Inspector of Factories' certificate of approval No. 10 and the relevant Patent application is No. 14577/58.

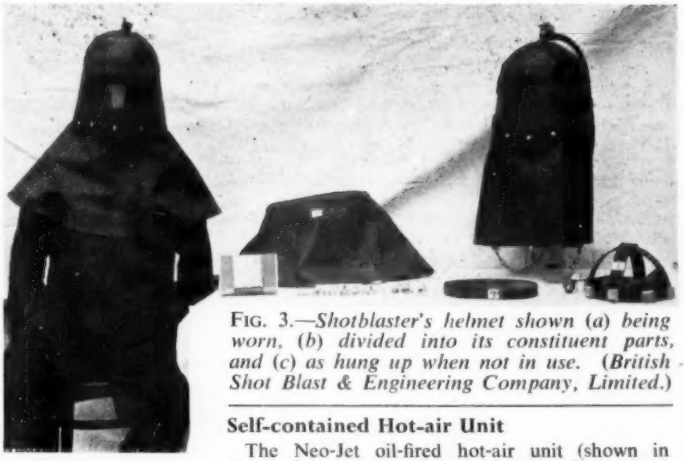

FIG. 3.—*Shotblaster's helmet shown (a) being worn, (b) divided into its constituent parts, and (c) as hung up when not in use. (British Shot Blast & Engineering Company, Limited.)*

Self-contained Hot-air Unit

The Neo-Jet oil-fired hot-air unit (shown in Fig. 4, has been designed by Modern Furnaces & Stoves, Limited, Booth Street, Handsworth Birmingham 21, to provide a portable unit to supplement their range of portable mould dryers (Newstad). The unit is streamlined, light but robust in construction, and is able to deliver 800 cub. ft. of hot air per min. at temperatures up to 300 deg. C. It is fully automatic and operates from a 15-amp. switch. When switched on, the spark ignition operates, the fan starts and hot air is emitted within two or three seconds. The unit burns ½ to 1 gall. of oil per hr., its cylindrical steel tank holding 15 gall.—with a full tank the unit weighs 250 lb.

Hoist Control: Geo. W. King, Limited, Stevenage, Herts, announce the Snip Snap, a new mains push-button control for hoists, which can be applied to all types of hoists, cranes and similar appliances which are wired for mains supply. The Snip Snap control dispenses with the conventional type of reversing contactor, and combines the function of contactor and pushbutton in one compact unit. The patented action avoids the possibility of single phasing. It is not suitable where low-voltage control is required, or can it be employed for remote control arrangements other than by simple extension of the feed cable.

Blade Pack: Simmonds Aerocessories, Limited, St. James, London, S.W.1, have introduced a new triple pack, containing one each of their standard, fine-cut, and half-round 10-in. interchangeable Surform blades.

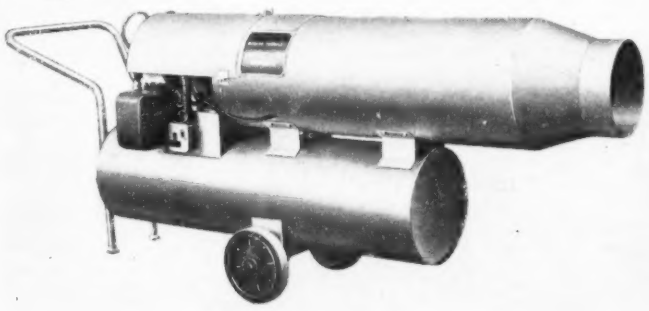

FIG. 4.—*Hot-air unit designed by Modern Furnaces & Stoves, Limited, of Birmingham.*

American Letter

Mottling in White-iron Castings*

The problem of producing white-iron castings without mottling or primary graphitization, and with adequate annealability, in the larger-section sizes has been considered. The iron must have sufficient graphitizing tendency in the solid state to be malleabilized by a commercially feasible heat-treatment. The test-casting used was a block 4 by 4 by 8 in. long made in a green-sand mould, fed by a 9 by 4½-in. dia. riser. Complete solidification took place 30 to 35 min. after pouring. Mottling data were obtained from fractures at the centre of the block. The fracture was called "white" only if it showed no evidence whatsoever of mottling. The effects of different carbon and silicon percentages on the fracture are shown graphically in Fig. 1—the base curve following the carbon and silicon limits for

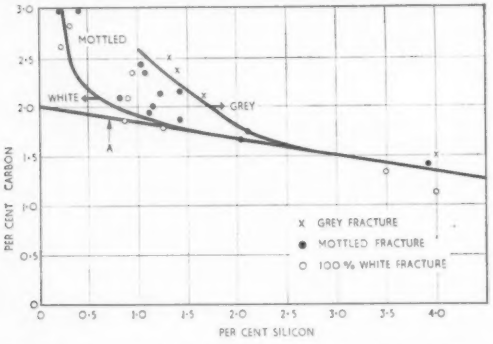

FIG. 1.—*Graph showing the effect of various carbon and silicon contents on the fracture obtained in a 4 by 4 by 8-in. casting. The maximum carbon and silicon percentages which yield a fully-"white" fracture, and the minimum carbon and silicon percentages which yield a completely grey fracture, are indicated by curves. (A = line of maximum solubility of carbon in an iron varying with silicon content, to the formula: per cent. C + ⅓ per cent. Si = 2.0.)*

producing "white" fractures is marked. Silicon contents of greater than 2.50 per cent. produced an interesting result—above this limit the base curves for white and grey fractures appear to be coincident. This means that a small increase in carbon content will change the fracture from white to completely grey.

Bismuth Additions

Bismuth additions to produce white fractures in heavy-section malleable castings have been used in the past, with the higher silicon and carbon contents. This practice is necessary to obtain sufficient graphitizing tendency on annealing. Bismuth additions in percentages over 0.01 per cent. proved, however, to be of no value in reducing mottling in the 4 by 4 by 8-in. test casting. Furthermore, too low a temperature (1,427 deg. C.) reduced the effectiveness of the additions. Water vapour was then found to be as effective as bismuth in raising the carbon and silicon limits for mottling. Future studies are to be aimed at discovering ladle additions and melting practices that will raise the carbon and silicon limits for mottling above the base-line curves presented in this report.

* First progress report on an investigation conducted by C. R. Loper, Jr., and R. W. Heine (department of mining and metallurgy, University of Wisconsin, Madison). The work is being sponsored by the American Foundrymen's Society, malleable division.

Lead-cemented Alloys

The feasibility of making a promising new class of metallic materials has been demonstrated in research at Battelle Memorial Institute, Columbus, Ohio. The new materials, prepared in research sponsored by the Lead Industries Association, are "lead-cemented" alloys made by mixing molten lead with finely divided solid particles of other metals or materials. The result is a material combining the properties of both lead and the second substance, usually a metal. Such combined-property materials may be useful in a variety of applications. For example, lead is effective in stopping gamma rays when used in nuclear-radiation shielding. With boron added, the resulting lead-cemented alloy would be an even more effective shielding material, since boron stops neutrons, which are also a product of radiation. The corrosion resistance of lead, plus the increased strength gained by adding other metals, suggests that some of these alloys might be useful to the chemical industry, and other industries requiring corrosion-resistant materials. Lead's softness, sometimes a disadvantage, can be an asset here, since the lead may serve as a binder for dispersing in mixtures containing less ductile materials, like tungsten, or materials with properties of special interest, such as very fine iron powder with its unusual magnetic properties.

Outlook for Copper and Aluminium Castings†

Since the end of World War II, the trend in copper and copper-alloy casting deliveries has been almost continually downward, the one exception being the increased consumption of copper-alloy wrought and cast plumbing fittings. Indeed, the brass and bronze foundry industry in general is in severe decline. One reason for this is the replacement of bronze bearings by ball and roller bearings. Another is that railway truck journals which were 100-per cent. babbitt-lined bronze 15 years ago are now either roller or steel-backed babbitt. Another newcomer to the bearing field is nylon, and aluminium is also under examination. However, bronze is still superior to all other bearings in applications above 5,000 r.p.m. Stainless-steel valves and other cast fittings have replaced brass and bronze in food processing and canning, as well as in bleaching and dyeing equipment, and stainless is also making great progress in the hospital equipment industry. Plastics have displaced brass castings for ornamental hardware for furniture, and in other household uses. Furthermore, aluminium art castings have also made great inroads into the ornament business, which at one time belonged exclusively to the bronze casting industry.

Aluminium

Apart from art-casting side, aluminium has made considerable progress in other fields. Producers of aluminium have an excellent and extensive research programme in hand, for developing new uses for aluminium, and better alloys. The industry has been blessed with stable prices, and has used this fact as one of its most important selling points—sales are continuously rising. The brass and bronze foundry industry must take a leaf from the aluminium book, and find, through research, new applications for its products. Quality must be improved, and prices stabilized.

† Extracts from a paper, by A. R. Barbour (vice-president of the Roessing Bronze Company, Etna, Pa.), presented at the Penn State Foundry Conference on June 25.

POA Annual Conference

The Purchasing Officers Association held its annual conference and "Minibition" at Folkestone this year, from September 24 to 26. The Minibition judges were: Mr. D. M. Forrest (chairman of the Design and Industries Association); Miss R. S. Absalom (buyer for Kent Alloys, Limited); and Mr. P. Fellows (head of the exhibitions department, Council of Industrial Design).

The winning stand in the educational class was that of P.I. Castings (Altrincham), Limited, of Cheshire (see illustration below).

Commodity Price-stabilization

In that they can be regarded as considered opinions of men responsible for the buying policy of influential firms in industry, the following views arising in discussions during the conference are important:

Mr. F. S. Lloyd (chief buyer, Crompton Parkinson, Limited), asked whether the aim of price stability was in itself sound, and if so whether or not the aim could be achieved. He himself felt that both the aims and objectives were sound, and that stability could in fact be achieved. He instanced commodities in which relative stability had already been achieved, but said that there were, however, difficulties in fixing the actual prices in relation to costs of production, changes in the value of the currency concerned, and fluctuating freight rates.

The Hon. John Grimston, M.P. (managing director, Enfield Rolling Mills, Limited), speaking of the commodities of which he knew best, said that he was on balance an anti-stabilizer. He said he had a personal dislike of Government intervention in business, and Government intervention was essential in any commodity price-stabilization scheme. He felt that the free market would give a greater degree of stability.

Mr. F. S. Anderson, C.B. (chairman of the International Wheat Council), spoke of the methods that had been used to achieve price stability. He outlined the effects of unstable prices in a large number of primary-producing and under-developed countries, and said that it had become generally recognized that there was a valid case for international commodity policy, although any such agreement on a truly international scale would be most difficult to achieve. However, agreements covering tin, sugar and wheat had been concluded, and Mr. Anderson outlined the provisions of these agreements.

Mr. B. S. Yamey, B.COM. (Reader in Economics, London School of Economics), felt that economic history in the last 50 years showed that fairly violent upward movements in price had been the major cause of expansions of productive capacity in the world. He also felt that the critics of price fluctuations should direct their criticism not against the fluctuations as such, but against the causes of these movements. Most swings in prices had been due to changes in the general level of economic activity, and such changes would be likely to play havoc with even the best conceived price-stabilization schemes. He concluded that less risky alternatives, not involving direct intervention, were likely to be available to achieve the given ends.

The award for the best educational display at the 1959 Minibition of the Purchasing Officers Association went to P.I. Castings (Altrincham), Limited, specialists in the production of precision investment castings. Their stand is shown in the accompanying illustration. The method of manufacture of these castings was shown very clearly in the display in a number of progressive sections supplemented by the die used, the wax patterns, the castings and the actual product incorporating them.

John Williams of Cardiff, Limited

A new name—John Williams of Cardiff, Limited—and a new trade symbol are announced for the long-established firm of ironfounders, metal-window manufacturers and steel stockholders previously known as John Williams & Sons (Cardiff), Limited. The name change has been made for brevity and convenience only, as the great- and great-great-grandsons of John Williams will still carry on the "and Sons" element of the old family title. Activities of this company include mass production of spheroidal-graphite and other high-duty iron castings.

Courses in Metallurgy

Two post-graduate courses have been arranged at the Metallurgy Department of the College of Advanced Technology, Birmingham. One is entitled "Recent Advances in Metallographical Techniques" and the other "Directionality in Metallic and Non-metallic Materials." Both courses are in the form of nine weekly evening lectures each by an authority in his particular field. The first-mentioned course commences on Thursday, October 22 and continues thereafter on successive Tuesdays, while the second will be held on Wednesday evenings from October 21 onwards.

German Foundrymen's Technical Association

October 28 to 30 Jubilee Meeting Programme

The German Foundrymen's Technical Association (*Verein Deutscher Giessereifachleute*) has issued invitations to its 50th annual meeting to be held at Düsseldorf from October 28 to 30. To mark the special occasion a number of interesting papers will be read at the Robert Schumann Hall—well known as the lecture venue of the 23rd International Foundry Congress held at Düsseldorf in 1956.

The first day of the meeting (Wednesday) has been reserved for works visits, and the morning of the second day starts with a meeting of the VDG's General Council, followed by sessions of the Council with the chairmen of the various technical sub-committees. In the afternoon, the 50th annual meeting will be opened officially with an address given by the VDG's national president, Dr. G. Schwietzke, after which the technical sessions begin. The following is the programme of papers to be read:

(1) The Stress Cube—Structure, Mode of Operation and Results of the Investigation carried out for Cast Iron, by Dr. J. Czikel (chairman: Dr. A. Wittmoser).

(2) Gas in Solution and Combined in Iron/Carbon Casting Alloys, by Dr. A. Köniğer (chairman: Dr. Siepmann).

(3) Impact Behaviour of Malleable Cast Iron, by Dr. K. Löhberg (chairman: Dr. K. Roesch).

(4) Quantitative Effect of Calcium Carbide on Melting with a Cold-blast Cupola, by Dr. Neumann (chairman: Dr. G. A. Jungbluth).

The sessions of the third day (Friday) will be held in the morning only and in two halls simultaneously:

Group A. Robert Schumann Hall. (9 a.m.-12.30 p.m.)

(5) Application of the Beuken-pattern for the Solution of Heat-transfer Problems in Foundry Practice, by Dr. K. H. Brockmeier (chairman: Dr. K. Orths).

(6) Efficiency of Feeder-heads, by W. Koppe (chairman: Dr. H. Stein).

(7) Grain Shape and Size of Clay-bonded Moulding Sands and their Influence on the Formation of Scabs, by D. Boenisch (chairman: Dr. W. Patterson).

Group B. Small Congress Hall. (9 a.m.-12 noon). After an opening address by P. Schiegries, Hilden, the following papers will be read:

(8) Copper/Hydrogen Equilibrium in Copper and Copper-base Alloys, by Dr. W. Hofmann (chairman: Dr. E. Tuschy).

(9) Production of Pressure-tight Castings in Copper and Copper-base Alloys, by E. Brunhuber (chairman: W. Weisner).

(10) Pressure-tight Castings in the Lightest Useable Alloy, by G. Lieby (chairman: P. Spitaler).

On Friday, October 30, members only will assemble at 3 p.m. in the Robert Schumann Hall under the VDG's president, Dr. Schwietzke. At 4 p.m. guests will be admitted and the assembly will be welcomed by the president, and the festive occasion will be supplemented by orchestral music played by the Bach Society, Düsseldorf, conducted by Dr. Neyses. Then follows the Jubilee lecture by Professor Dr. F. Baade, director of the Institute for World Economics at the Kiel University, entitled "Iron and Steel in the World of Tomorrow."

After closing the jubilee meeting, the president will invite members and guests to attend a social evening in the Rheinhalle at 8.30 p.m. with a variety show and musical events, followed by dancing.

(*Continued at foot of col. 2*)

ECSC Coal Crisis

A warning against the dangers of individual member states taking unilateral action to deal with the continuing coal crisis was given recently by the new president of the High Authority of the European Coal and Steel Community, Mr. Malvestiti. Such action, he said, could seriously compromise the achievement of a co-ordinated energy policy. Such a policy was necessary in view of the urgent need which faced the coal industry to adapt itself to a new situation.

The ECSC must take the lead, but two conditions had to be fulfilled; there was a need for a complete and accurate energy balance-sheet and there had to be a Community power of co-ordination. The new High Authority agreed that a new initiative—limited but decisive—was needed and it had therefore drawn up proposals for submission to the Council of Ministers and the Parliament.

Mr. Malvestiti doubted whether the right solution was the creation of a single Community for energy; and he was not sure whether co-operation with the other two Communities would be sufficient for the task ahead. But in his view it was important to keep those institutions which had been tested by experience and he considered it his duty to maintain the essential nature of the ECSC—the independent and direct powers of the High Authority.

He was against sudden or major change, but that did not preclude making adjustments to improve the functioning of the ECSC and to adapt it to new conditions. Defending the High Authority against allegations of failure to give due warning of dangers ahead, the president said that both the reasons behind the crisis and remedies to deal with it had been clearly stated on numerous occasions in High Authority documents. This had not prevented its opponents from resisting changes which, however urgent, might prove painful. He appealed to governments and professional and trade union organizations to co-operate in finding a solution for the problems of the coal industry.

Frederick Braby acquires Auto Diesels

The whole of the issued share capital of Auto Diesels, Limited, Uxbridge (Middx), has been acquired by Frederick Braby & Company, Limited, structural engineers, manufacturers of steel sheets and bars etc., of London, N.W.1. Of the purchase price, £309,972 has been paid in cash, the balance being satisfied by the issue of £90,000 ordinary capital, valued at 22s. 10½d. per £1 unit, the middle market price the day before the acquisition contract was signed. The vendors have agreed not to part with the ordinary shares to be received for a period of three years.

Auto Diesels, with its subsidiaries, Diesel Equipment, Limited, and Norman Industrial & Marine Engine Company, Limited, has five main divisions—electrical, oilfield, pump and hydraulic machinery, gas turbine, and aeronautical.

Mr. F C. Braby, chairman of Frederick Braby & Company, says it is anticipated that the acquisition will result in considerable benefits to the company. It is intended that the combined manufacturing facilities shall be utilized to the best advantage.

Personal

Mr. H. D. BOYD has resigned from the board of Edgar Allen & Company, Limited.

Mr. J. DUMMELOW has been appointed publicity manager of the Metropolitan-Vickers Electrical Company, Limited.

Mr. E. F. HODGES has been appointed chief metallurgist with the Knowsley Cast Metal Company, Limited, Trafford Park, Manchester.

Mr. W. J. HEPWORTH has been appointed a director of Aeroplane and Motor Aluminium Castings, Limited, a member of the Associated Engineering group.

Mr. GEORGE HEYWOOD, general manager of John Hall & Son (Oldham), Limited, Crossbank Street, Oldham, has been appointed a director of the company.

Mr. J. V. CHATTERTON has relinquished his post with Bilston Foundries, Limited, to take up an appointment as production manager with High Duty Alloys, Limited, Slough.

Mr. F. BONSALL, who for four years has been a director and general manager of British Furnaces, Limited, Chesterfield, has been appointed deputy managing director.

Field-Marshal VISCOUNT MONTGOMERY will inaugurate the new engineering building at Glasgow University next month, and during his visit will be presented with the honorary degree of Doctor of Laws.

Mr. C. H. FLURSCHEIM B.A., M.I.E.E., a director and the chief electrical engineer of Metropolitan Vickers Electrical Company, Limited, has been co-opted to serve on the Council of the British Welding Research Association.

Mr. FRED ARCHDALE and Mr. WILL ARCHDALE have resigned from the board of the Staveley Coal and Iron Company, Limited. They will remain on the board of its subsidiary, James Archdale & Company, Limited, for the time being.

Mr. L. G. WILLIAMS has retired from his position as sales manager of Purimachos, Limited, fire-cement manufacturers. Mrs. M. J. MURRAY has been appointed sales manager and is already operating from the company's head office in Bristol.

Mr. R. BALL has been elected a director of H. and C. Davis, Limited, light constructional and industrial engineers, Clapham Common, London, S.W.4, and has been appointed chairman in succession to Major-General A. H. GATEHOUSE, who has retired.

Prof. JOHN MENZIES KAY, who is Professor of Nuclear Power, Department of Mechanical Engineering, Imperial College of Science and Technology, University of London, City and Guilds College, is the new president of the Junior Institution of Engineers.

Mr. B. MALONE has relinquished his post with Southern Foundries, Limited, Croydon, in the Federated Foundries group, to join the Electric Resistance Furnace Company, Limited, as manager of the new foundry-equipment division at Weybridge, Surrey.

Mr. R. J. BAINES, sales manager of Henry Balfour & Company, Limited, has left England for a short visit to Nigeria, where he hopes to meet ministers of the three Nigerian governments and discuss the wide range of development in that country's industrial expansion.

Union Carbide, Limited, Alloys Division, 103, Mount Street, London, W.1, announce that Mr. P. J. SCRATCHLEY has resigned from the company, and Mr. R. WILSON, divisional managing director, has temporarily assumed the responsibilities of sales manager for the alloys division.

Mr. B. WILLIAMS has been appointed resident technical sales representative at the Bristol office of Crofts (Engineers), Limited, Bradford (Yorks), in place of Mr. DAWSON, who has retired. He takes up his new duties on November 2. The address of the Bristol office is 28, Queen Square (telephone: Bristol 25289).

Award of the Vickers Prize and Medal of the Junior Institution of Engineers has been made to Mr. JOHN L. COOPER, who is with Davy-United, Limited, Sheffield, for his paper on "Steel Processes." His father, Mr. HERBERT E. COOPER, a Sheffield garage owner, receives the institution's H. G. Riddle Memorial Prize for a paper on "Angles on Angling."

Mr. L. L. BOYD, at present managing director, United Steel Companies (India) Private, Limited, and director, United Steel Companies (Pakistan), Limited, is shortly to return to the United Kingdom, to take up, with effect from March 1, 1960, the position of deputy commercial manager at United Steel's Steel Peech and Tozer branch, Rotherham.

Miss VALERIE LEWIS, apprentice draughtswoman at Hymatic Engineering Company, Limited, Redditch, has received a five-guinea prize for her essay written for a competition organized during the Safety and Factory Efficiency Exhibition, held at Bingley Hall, Birmingham, earlier this year. The prize was awarded by the Dunlop Rubber Company, Limited.

Dr. CHARLES SYKES, managing director of Thos. Firth and John Brown, Limited, Sheffield, has been appointed by Mr. Aubrey Jones, Minister of Supply, to the Royal Ordnance Factories Board. Dr. Sykes was formerly superintendent of the Metallurgy Department of the National Physical Laboratory from 1940 to 1944. At the end of his time there he superintended the terminal ballistics branch of the Armament Research Department.

Dr. A. H. SULLY, the director of the British Steel Castings Research Association, is attending the annual conference of the Steel Founders' Society of America in Cleveland from November 9 to 12. He has been invited to lecture to the conference on "Problems of Dust and Noise-control in Steel Foundries." This invitation is a tribute to the pioneering work which British steelfounders, through their Research Association, have carried out in the field of industrial health. As a consequence of this work, the risk of silicosis in steel foundries is being progressively diminished. While in North America, Dr. Sully is also making a number of visits to foundries and research centres in Canada and the US.

Mr. J. A. KEMP, a director of Albion Motors, Limited, has relinquished his position as the company's chief designer. His services, however, will still be available to the company in a consultative capacity. Mr. Kemp, who has been associated with the motor industry since 1905, joined the Albion Company in 1934, and during the last two years has been responsible for the design of a new range of Albion vehicles. Mr. STEAD, formerly technical manager of the company, has been appointed chief engineer. Also announced by the parent company, Leyland Motors, Limited, is the retirement of Mr. J. MCHUGH from his post as houseman of Wellington House (the student engineers' hostel of the company), an appointment he has held since 1922. The "old boys" of Wellington House have started a fund, and a presentation to "Jim" to mark his retirement, will be made at the annual reunion to be held at Blackpool on October 17.

News in Brief

DURING THE QUARTER ending September 30, Platt Bros. (Sales), Limited, a subsidiary of Stone-Platt Industries, Limited, received orders totalling more than £1,250,000 for cotton-spinning ring frames.

Dr. R. M. BOZORTHM of Bell Laboratories in the United States, lectured to the Permanent Magnet Association in Sheffield City Memorial Hall on October 8. He dealt with new varieties of magnetic materials.

A SLOT DISPENSER for paraffin, providing quantities worth 2s., has been installed in a shop in Union Street, Middlesbrough. It has been invented by Mr. Fred Cottrell and made by the Erimus Engineering Company of Middlesbrough

THE AUTUMN MEETING of the Institute of Welding will be held in London from November 3 to 6, and will be a joint one with the French Society of Welding Engineers, about 50 of whom will be taking part. The general subject is quality-control in welding.

ROTARY ELECTRICAL COMPANY, LIMITED, have opened new premises in Gilpin Street, Sheffield, covering 6,500 sq. ft. The firm which started with a staff of six in a one-floor rented workshop, now has 60 employees and the company is considering setting up its own apprentice training scheme.

MORTON MACHINE COMPANY, LIMITED, Wishaw, Lanarkshire, have received an order for dough-mixing machines worth 55,000 dollars (about £20,000) from a leading American baking concern. A further order for similar machinery valued at 200,000 dollars (about £72,000) is under negotiation.

FIRTH-VICKERS STAINLESS STEELS, LIMITED, of Sheffield, have secured an order worth over £1,000,000 for hundreds of tons of stainless steel for the Chinese People's Republic. Deliveries start at the end of this month and continue until next April. The contract was won in face of world competition.

JAGOE KALEO, spokesman of the Ghana delegation to the forthcoming British Commonwealth Parliamentary Conference in Canberra, said in Brisbane last week, that both Ghana and Nigeria proposed to transfer some of their trade to Australia, and that Australian companies would be invited to open up Ghana's iron-ore deposits.

FACILITIES for the use of a landing ground for helicopters and light aircraft for the United Steel Companies, Limited, at Hady Hill, Chesterfield, have been approved in principle by Chesterfield Corporation. United Steel also recently approached Chesterfield Rural Council for permission to build an airstrip at Apperknowle, near Chesterfield.

THE 20,000-TON Royal Mail liner Aragon will be launched by Lady Snedden—wife of Sir Richard Snedden, director of the Shipping Federation—at Harland & Wolff's shipyard, Belfast, on October 20. The vessel is a sister ship of the Amazon, which was launched by Princess Margaret in July. A third liner for the same company, the Arlanza, is also being built in Belfast.

SLINGSBY SAILPLANES, LIMITED, Kirbymoorside, Yorkshire, have received an order from the Russian trade delegation in London for a Skylark 3B. This will be the first complete aircraft to be exported from this country to Russia. The company has produced 1,148 aircraft since 1942, and their latest overseas customers include the Aero Club of Modena in Italy, and the Club de Planeadores de Concepcion, Chile.

ALDERMAN E. N. HILEY, secretary of the National Brassfoundry Association, was the speaker at the October luncheon meeting of the Non-Ferrous Club, held at the Queen's Hotel, Birmingham. He spoke about the traditions of the City of London which included Guildhall procedures. A collection taken at the meeting on behalf of the Birmingham Federation of Boys' Clubs, realized the sum of £17 2s. 6d.

A MEETING OF JUNIOR ENGINEERS organized by the Iron and Steel Institute, will be held at Glasgow on October 28 and 29. The meeting will include visits to the General Ore Terminus, Clyde Iron Works, Clydebridge Steelworks and Ravenscraig Iron and Steelworks of Colvilles, Limited, the Clydesdale Steelworks and Tube Works of Stewarts and Lloyds, Limited, and the works of the North British Locomotive Company, Limited.

A HALF CENTURY CLUB for employees over the age of 50 has been formed by the Rubery Owen group of companies. The club is part of the preparation-for-retirement programme on which the group is now formulating a pilot policy. Membership of the new club is open to employees who have attended the pre-retirement course. In charge of the club is Miss Grace Owen, daughter of Mr. A. G. B. Owen, chairman and managing director of the Rubery Owen organization.

THE VENEZUELAN MINISTRY OF MINES AND HYDROCARBONS has confirmed that the Government is preparing a new policy for the exploitation of Venezuela's iron-ore reserves. The deposits will be controlled by the Government, while no further exploitation concessions will be granted for the time being. One of the first steps to be taken in the execution of the new policy covers the smelting of the ores which will make it possible for the refined product to be placed directly on the world market.

THE 1959 CONGRESS of the *Bureau International de la Récupération* is to be held in Düsseldorf from October 27 to 29, all meetings being held at the Rheinterrasse, Hofgartenufer, 7. The first and last days of the congress will be devoted to meetings of the various committees, and the Wednesday sessions will include, in the morning, a meeting of the scrap iron and steel section, and in the afternoon, the non-ferrous metal section. The congress will conclude with the official banquet on the Thursday evening.

IT IS REPORTED that work has commenced on a $1,000,000 extension to the existing plant of Fischer Bearings Manufacturing Company, Limited, at Stratford, Ontario, Canada. The company, which is a subsidiary of Kugelfischer George Schafer & Company, Germany, was founded in 1954 and now employs 220 people. Its products include high-precision instrument bearings and aviation bearings. The new addition to the plant will house a production system for water-pump spindle bearings which has been developed in the Canadian plant.

EXTENSIVE ADDITIONS are at present being made to the British Steel Castings Research Association in Sheffield. These comprise new laboratories and offices and a substantial addition to the experimental steel foundry. With these extensions, which will be completed early in 1960, the Association will have over 20,000 sq. ft. of floor-space, which will house its steelmaking, foundry processes, general metallurgy, plant engineering and industrial health sections, as well as its library and information centre and administrative offices.

AT A MEETING of the National Trades Technical Societies held at the East Hecla Works of Hadfields,

Limited, on October 6, over 45 members were present to hear a paper by Mr. E. G. Gardner, patternshop manager of Hadfields, entitled "Epoxy Resin in Patternmaking." Following Mr. Gardner's address, in which he dealt with recent developments in patternmaking and the benefits to be gained by the use of resin patterns, Mr. Cedric Platts, a patternmaker, gave a practical demonstration on "How it should be done." An open discussion concluded the meeting.

IF PLANS FOR BUILDING an agricultural-implement factory in Chesterfield are approved by the Board of Trade, the Sheffield firm of S. & J. Kitchen, Limited, hope to open the new industry in the town very soon. Chesterfield Corporation's Town Planning Committee has already given their approval of the site of the factory, which, it is estimated, will cover 45,000 sq. ft. of floor space and will probably employ up to 250 people, who in the main will not be skilled. S. & J. Kitchen, general engineers and agricultural tool makers, have been established in Sheffield for over a century.

APPLEBY-FRODINGHAM STEEL COMPANY, a branch of of the United Steel Companies, Limited, are installing a tonnage-oxygen plant at their Scunthorpe works at an estimated cost of £750,000. Principal contractors for the plant are Air Products (Great Britain), Limited, the British subsidiary of Air Products Incorporated, of Allentown, Pennsylvania, USA. All the structural steelwork is being fabricated by United Steel Structural Company, Limited, a United Steel subsidiary, and the complete installation will be carried out by Woodall-Duckham, Limited.

COUNCILLOR J. A. BROWN, of Middlesbrough, chairman of the Tees-side Smoke Abatement Committee, presided over a conference at Middlesbrough to mark the launching in the Tees-side area of a Clean Air Campaign on October 5. He said that wherever there were industries and domestic chimneys there must be smoke, but it was hoped that in 15 years' time pollution would be scarcely noticeable. Smokeless zones were already contemplated for the area. Dr. J. G. Smith, former deputy town clerk of Middlesbrough, later opened an exhibition in All Saints' Hall, Middlesbrough.

A ONE-DAY SYMPOSIUM on the "Application of Thin-film Techniques to the Electron-microscopic Examination of Metals," arranged by the metal physics committee of the Institute of Metals, will be held on Thursday, November 12, at the Royal Institution, 21 Albemarle Street, London, W.1, commencing at 9.30 a.m. In connection with the meeting, an informal conversazione will be held at 17, Belgrave Square, London, S.W.1, on the evening of Wednesday, November 11. Tickets, price 6s., required only for the conversazione, are obtainable from the secretary of the Institute, at Belgrave Square.

THE INSTITUTION OF PLANT ENGINEERS announces that Dr. H. A. Thomas, D.SC., M.SC., has consented to give a paper on "An introduction to Electronic Data Processing" at the Royal Institution on December 3. The paper will be illustrated with working models, slides, and films, and following the lecture, an exhibition, including a working computer, will be staged by Elliott Bros. (Automation), Limited. Admission will be by ticket only and applications for these should be made to Mr. L. R. Leworthy, M.I.PLANT E., chairman London branch papers committee, the Institution of Plant Engineers, 2, Grosvenor Gardens, London, S.W.1.

AN ORDER worth £1,500,000 for a fleet of 200 single-deck buses was received last month by Leyland Motors, Limited and Metropolitan-Cammell-Weymann Limited, from Omnibus Metropolitanos S.A. of Havana. The first batch was shipped from Liverpool last week, and regular shipments will follow until all are delivered. According to reports from Australia, Leyland Worldmaster buses, already in service for the Department of Government Transport, New South Wales, are showing a fuel saving of 8 per cent. The Department has now placed an order for another 50 of these buses, making a total of some £1,300,000 invested in this type of vehicle.

SIR HUGH CHANCE, chief speaker at the meeting of the West Bromwich and Smethwick Manufacturers' Association on October 1, said that making unskilled and semi-skilled men happy in factories was one of industry's two biggest problems. Advanced technicians were vitally important but employers should not ignore the ordinary rank and file in the plant, Sir Hugh warned, saying that "the man who sweeps the shopfloor must be treated as an important part of the set up. The effect he has on the morale and life of a factory is considerable." Problem number two, Sir Hugh said, was the need for firms to increase their training facilities to cope with the "bulge" of school leavers which would reach its peak in 1962. Potentially sound material would be lost if apprenticeship schemes were not extended. "These apprentices will be the skilled technologists industry will need in the future," Sir Hugh added.

Obituary

Mr. THOMAS P. N. BURNESS, chairman of Ambrose Shardlow & Company, Limited, engineers, Meadowhall, Sheffield, died suddenly on October 6, at the age of 69. He had been a director of the company for more than 12 years and was chairman for the last four years.

The death occurred on October 5 of Mr. WALTER BLAKEBOROUGH, a former managing director of J. Blakeborough and Sons, Limited, Brighouse (Yorks), and the eldest son of the founder of the firm. Aged 87, Mr. Blakeborough started work in the family firm when he was 13, and was taking an active part in the management by the time he was 20. Under his management, the firm expanded rapidly, but ill health forced him to retire in 1923, though he retained his seat on the board until 1946. Mr. W. Ralph Blakeborough, the present managing director of the firm, is his son.

Recent Wills

REID, R. J. C., former manager of the Belfast Ropework Company, Limited, Hull (Yorks) £74,828

YATES, ALEC, a director of Yates Bros. (Norton Canes), Limited, boat builders and repairers, etc. ... £17,553

NORTON, HORACE, a founder member of the Norton-Marty Engineering Company, Limited, Tipton (Staffs) £11,807

ALLEN, G. W., a director of the Dronfield Casting Company, Limited, Dronfield (Derbyshire), and the associated Dronfield Tool Company, Limited £16,396

WILSON, A. H., managing director of Evered & Company, Limited, brassfounders, tubemakers, etc., of Smethwick (Staffs), and president of the National Brassfoundry Association during its diamond jubilee celebrations last year £75,243

Raw Material Markets

Iron and Steel

Current usage of pig-iron is not calling for any appreciable increase in supplies and producers generally have no difficulty in fulfilling demands from outputs. They still hold fairly large stocks in most grades of pig-iron. As long as this position lasts it is unlikely that additional furnaces now out of production will be brought back. In many instances those now in blast are working below capacity levels. The steelworks are now using larger quantities of raw materials to obtain increased ingot production, but with good supplies of suitable scrap available the use of pig-iron is reduced. Adequate supplies of basic steel making pig-iron are available and current production can be stepped up as demands warrant.

In the foundry grades of pig-iron consumers' requirements are met satisfactorily. The low-phosphorus irons, which continue in much bigger demand compared with other grades, are in good supply. The overall quantities available from the several sources now supplying this type of pig-iron are sufficient to satisfy the needs of the engineering and speciality foundries. Hematite pig-iron is also plentiful, and refined iron makers have capacity available to enable them to take on business on a much larger scale. High-phosphorus pig-iron makers are in need of more orders fully to absorb current outputs, and the stocks on hand at the furnaces are appreciable.

The present pig-iron supply position does not warrant the foundries carrying large stocks and only those tonnages required for work on hand and current stock are being requisitioned. Export orders, mostly for the high-phosphorus irons, account for a fairly reasonable tonnage.

Varying grades of activity still exist at the foundries. Production of high-duty castings continues on a good scale with the motor vehicle trade in the forefront of consumers. The machine-tool trade continues to show some improvement, but from railways, collieries, and some of the engineering trades demands remain low. The light-castings trade continues to improve on certain types of castings, notably for the domestic utensil trade but there is still room for improvement. The jobbing foundries maintain a fair rate of production, but the textile foundries are only moderately employed.

The foundries are able to obtain most of their scrap requirements without difficulty. Foundry coke is coming to hand satisfactorily, and ganister, limestone, and firebricks are readily available.

There is a substantial call for steel semis from all areas and the supplying steelworks are committed for their outputs for some weeks ahead—in some instances up to the end of the year. Increasing demands for small bars and light sections are being received by the re-rollers and those supplying reinforcing rods have heavy order-books. All arisings of suitable re-rolling defectives and crops are easily disposed of by the steelworks.

Non-ferrous Metals

Towards the end of last week, President Eisenhower took action to halt the national steel strike by invoking the Taft-Hartley Act on the grounds that "the national interest demands an immediate resumption of production in this vital industry." Yet "experts" are completely at variance on their estimates as to how long it will be before the industry is back in full production. More important, however, is the fact that the issues which made up the dispute are no nearer to being solved and the outlook is for a resumption of the strike after the 80-day cooling off period unless some mutually agreed basis for compromise can be found.

The Taft-Hartley Act has now been used to break up both the dock strike and the steel strike, but it can hardly be operative in the case of the copper industries' dispute as this strike could not conceivably come under the heading of creating a national emergency. The present position is that the US copper strike looks like going on indefinitely as no more than half-hearted attempts have so far been made to find a *modus operandi*. Stocks are, therefore, fast disappearing and the fact that the one operating custom smelter in the US has quoted 33 cents a pound only for December and January indicates that it has no copper to offer in October and November. In these circumstances US traders have been asking, and getting, 34 cents a pound for November delivery and, for a brief period, when the fate of the dock strike stood in the balance, prompt metal was fetching as much as 36½ cents a pound, equivalent to £292 a ton.

The Braden copper strike at the El Teniente mine is now in its second week, and while the labour unions have accepted the Chilean Government's proposals for a settlement, the company has set some conditions the acceptance of which by the unions has yet to be agreed. The strike of transport workers in the Belgian Congo also continues.

Strangely enough, the London market has not benefited pricewise from these various strikes. Liquidation of bull positions has kept the price down and the quotation at the beginning of this week showed a decrease compared with the previous week. However, the outlook must be considered bright. This view would be enhanced if the US steel industry were to get into its stride quickly and some reasonable overtures were made with regard to settling all the issues outstanding. As it is, the strike at the Braden copper mine cut this country off from a high proportion of the 16,000 tons a month produced by this mine. The answer may be that the LME has yet to consider the present situation serious with the weight of copper available in stocks. Yet the fall last week, by 1,516 tons to 11,547 tons, could be the preamble to the scramble which could ensue.

The tin market is now firm. This is more than a mere papering over of the cracks, as demand is good in London and in the East, while continental inquiry is satisfactory. Indeed, the price has now reached another 1959 peak and the outlook is good enough to predict that the buffer stock manager should be enabled to unload his stocks with impunity. In the US the market is very patchy because of the steel strike, but this should now pick up perceptibly. The US price is hovering around $1.03 a pound.

Lead is steady, but featureless, both in London and in New York. In London the price is struggling to maintain itself at £70 a ton and in America it is holding at 13 cents a pound. Zinc is a better market in London than in New York, where the price is unchanged at 12 cents a pound. Demand is good and with consumers concentrating on prompt metal, which is scarce, the undertone is very firm and the outlook good. Should the US steel industry come to some amicable settlement as to future operations, the US market should pick up considerably.

BROWN BAYLEY, LIMITED—Mr. Robert Barnaby, who is managing director of Brown Bayley Steels, Limited, has been appointed a director.

Baker Perkins Machinery at work . . . . . *at Peter Brotherhood Ltd.*

Peter Brotherhood Ltd. use this 'Cadet' Rotary Table Shot Blast Machine for a wide range of application at a high production rate. Note especially the control desk which includes signal lights, 24 volt current socket for inspection and ammeters indicating the shot output of the impeller. The wiring circuit is arranged for automatic operation to cut out human errors.

Please write for further details to:

BAKER PERKINS
Foundry Machinery Division
PETERBOROUGH WORKS · PETERBOROUGH · ENGLAND

BP/F2

HISTORICAL NOTE

Peter Brotherhood Ltd. were established in London in 1868. In 1907, the works was transferred to Peterborough, Northants. In their Foundry, they produce a wide range of general engineering castings for air and gas compressors, steam turbines, steam engines, refrigeration plant, water turbines, chemical filtration plants, textile machinery, brewery machinery, and many other applications

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

October 14, 1959

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire, in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 0s. 0d. to £42 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £54 0s. 0d. to £57 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 5d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 5d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy). —4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent., Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr.; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0½d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons. £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

* Average 68–70 per cent.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £232 5s. 0d. to £232 15s. 0d.; three months, £232 5s. 0d. to £232 10s. 0d.; settlement, £232 15s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 3½d. per lb.; rods, 248s. 0d. per cwt. basis; 20 s.w.g., 283s. 0d. per cwt.

Tin.—Cash, £794 0s. 0d. to £794 10s. 0d.; three months, £794 0s. 0d. to £794 10s. 0d.; settlement, £794 10s. 0d.

Lead (Refined Pig).—First half October, £70 0s. 0d. to £70 2s. 6d.; first half January, £71 5s. 0d. to £71 7s. 6d.

Zinc.—First half October, £88 15s. 0d. to £89 0s. 0d.; first half January, £86 10s. 0d. to £86 12s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £122 10s. 0d.; rolled zinc (boiler plates), all English destinations, £120 5s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £101 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10¾d. per lb.; sheets to 10 w.g., 202s. 9d. per cwt.; wire, 2s. 8¼d.; rolled metal, 202s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £154; B6, £202.

Brass (High Tensile).—BS1400, HTB1, £189; HTB2, £201; HTB3, £215.

Gunmetal.—BS1400, LG2, £192; LG3, £202; G1, 1%, £252; G1, 1%, £241.

Phosphor Bronze.—BS1400, PB1 (AID released), £288; BS1400, 90/10/1, £268.

Leaded Phosphor Bronze.—BS1400, LPB1, £211.

Phosphor Bronze Strip, etc.—Strip, 290s. 3d. per cwt.; wire, 4s. 1d. per lb.; rods, 3s. 4d.; tubes, 3s. 4d.; chill cast bars: solids 3s. 3¾d.; cored 3s. 4¾d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10¼d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3¼d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 2¼d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £71 10s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £236; AB2, £247.

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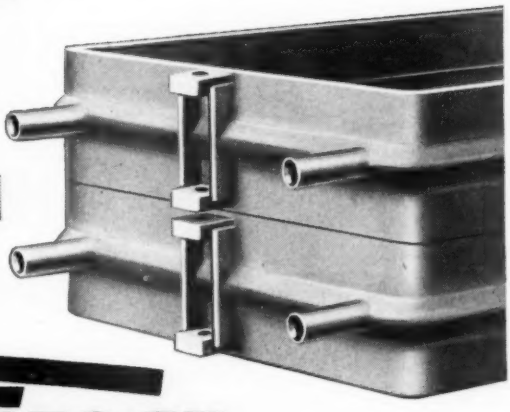

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Pig-iron and Steel Production

Statistical Summary of July Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table 1 summarizes activities during recent months. Table 2 gives production of steel ingots and castings in July. Table 3, weekly average production of finished steel in June. Table 4 gives the production of pig-iron and ferro-alloys in July, and furnaces in blast. (All figures are weekly averages in thousands of tons).

TABLE 1.—*Iron and Steel Price Index and General Summary of Pig-iron and Steel Production.*

Period.	B.o.T. Price Index, 1938 = 100.			Iron-ore output.	Imported ore used.	Coke sent to blast-furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy).			
	Iron and steel.	Coal.	Basic materials[1]						Imports.[2]	Prod. ingots, castings.	Deliv'rs. finished steel.	Stocks.[3]
1957	328	488	537	325	303	270	275	220	14	417	322	1,444
1958	343	503	478	276	262	227	245	196	9	369	284	1,542
1959—Apl. ..	342	504	476	299	219	201	231	211	5	387	297	1,459
May ..	342	487	478	292	236	203	240	211	8	385	285	1,457
June[4]	338	487	475	285	232	204	235	214	9	388	292	1,425
July ..	338	487	472	275	226	201	222	169	7	320	—	1,436

TABLE 2.—*Average Weekly Production of Steel Ingots and Castings in July*, 1959.

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derbys, Leics, Notts, Northants and Essex ..	—	4.0	13.7(basic)	1.5	—	18.1	1.1	19.2
Lancs (excl. N.W. Coast), Denbighs, Flints, and Ches	0.5	30.8	—	4.2	0.3	34.7	1.1	35.8
Yorks (excl. N.E. Coast and Sheffield) ..								
Lincs	—	40.3	—	—	0.1	40.3	0.1	40.4
North-East Coast	0.4	52.4	—	1.0	0.3	52.8	1.3	54.1
Scotland	0.5	17.7	—	1.3	—	18.6	0.9	19.5
Staffs, Shrops, Worcs, and Warwicks	—	14.8	—	2.6	0.6	16.6	1.4	18.0
South Wales and Monmouthshire	1.9	81.8	7.2(basic)	0.7	0.1	91.4	0.3	91.7
Sheffield (incl. small quantity in Manchester) ..	5.8	22.6	—	8.9	0.3	36.2	1.4	37.6
North-West Coast	0.1	0.4	3.1 (acid)	0.4	—	3.9	0.1	4.0
Total	9.2	264.8	24.0	20.6	1.7	312.6	7.7	320.3
June, 1959[4]	13.5	320.8	24.9	27.2	2.1	378.3	10.2	388.5
July, 1958[4]	13.7	260.6	22.4	17.4	1.8	307.5	8.4	315.9

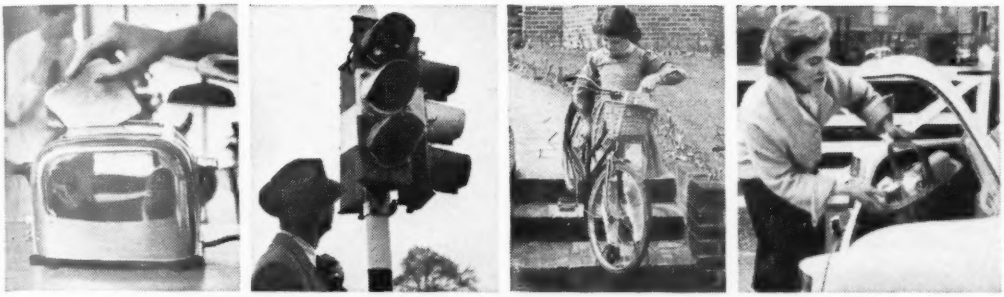
TABLE 3.—*Deliveries of Non-alloy and Alloy Finished Steel.*

Product.	1957.	1958.	1958.	1959.	
			June.	May.	June.*
Non-alloy steel:					
Ingots, blooms, billets and slabs[5]	5.0	4.6	3.9	5.1	4.9
Heavy rails ..	11.2	10.2	12.8	7.3	7.4
Sleepers	1.3	1.2	1.7	0.5	1.0
Fish and soleplates	0.8	0.7	0.9	0.6	0.6
Plates:					
(i) Over ⅜ in. thick	34.0	29.6	32.0	23.8	23.2
(ii) Under ⅜ in...	20.3	17.7	18.5	18.8	19.3
Other heavy prod.	53.0	41.8	44.4	41.4	39.2
Ferro-concrete bars	8.9	7.6	8.3	8.7	10.6
Wire rods	23.3	21.5	21.0	24.2	25.4
Arches, etc. ..	11.0	8.6	8.4	8.5	7.9
Other light sections	38.7	29.1	27.9	30.5	33.7
Bright steel bars ..	7.0	6.2	6.3	7.1	7.5
Hot-rolled strip ..	23.1	22.6	23.2	26.9	29.0
Cold-rolled strip ..	7.1	7.0	7.0	7.3	8.1
Sheets, ...					
(i) Hot rolled ..	13.0	10.6	10.8	10.1	12.6
(ii) Cold rolled ..	29.1	31.1	31.8	34.7	35.5
Tinplate:	18.8	18.7	20.3	20.5	20.7
Blackplate.. ..	1.0	0.8	0.8	0.6	0.7
Tubes up to ⅛ in...	22.1	19.0	21.4	18.1	20.1
Tube, and pipe f'tgs	0.5	0.4	0.4	0.4	0.3
Tyres, wheels, axles	5.1	4.5	5.6	2.6	2.2
Forgings (excl.drop)	3.1	2.6	3.0	2.5	2.0
Steel castings ..	4.6	4.2	4.9	3.7	3.6
Tool and magnet	0.3	0.2	0.3	0.3	0.2
Total	342.3	300.5	315.6	304.2	315.7
Alloy steel	17.8	16.1	18.7	17.4	18.8
Total from UK[6] ..	360.1	316.6	334.3	321.6	334.5
Imported steel ..	9.6	7.1	8.1	8.3	7.3
Deduct: Intra-industry conversions[7] ..	369.7 48.2	323.7 41.2	342.4 40.2	329.9 46.5	341.8 50.7
Total new material..	321.5	282.5	302.2	283.4	291.1

TABLE 4.—*Production of Pig-iron and Ferro-alloys*

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derbys, Leics, Notts, Northants and Essex	17	0.5	20.4	16.9	1.2	—	39.0
Lancs (excl. N.W. Coast), Denbighs, Flints, and Ches ..	7	—	21.6	—	—	1.4	23.0
Yorks (excl. N.E. Coast and Sheffield)	—	—	—	—	—	—	—
Lincs	8	—	39.8	—	—	—	39.8
North-East Coast	17	3.0	39.8	—	—	0.7	43.5
Scotland	5	0.2	13.2	0.6	—	—	14.0
Staffs, Shrops, Worcs, Warwicks	4	—	5.6	0.9	—	—	6.5
S. Wales and Monmouthshire	10	2.8	49.5	1.0	—	—	53.3
Sheffield	2	—	3.5	—	—	—	3.5
North-West Coast	7	11.6	—	0.2	—	0.9	12.7
Total ..	77	18.1	193.4	19.6	1.2	3.0	235.3[4]
May, 1959 ..	80	19.0	198.5	17.3	1.4	4.3	240.5
June, 1958 ..	88	23.7	193.4	22.0	0.6	3.5	243.2

[1] Used in non-food manufacturing industries.
[2] Weekly average of calendar month.
[3] Stocks, mainly ingots and semi-finished, at the end of the year and months shown.
[4] Five weeks, all tables.
[5] Other than for conversion into any other form of finished steel listed.
[6] Includes finished steel produced in the UK from imported ingots and semi-finished steel.
[7] Material for conversion into other products also listed in this table.



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Book Review

Out of the Sky—An Introduction to Meteoritics, by Dr. H. H. Nininger. Published by Dover Publications, Inc., 180, Varick Street, New York, 14, N.Y., USA; price $1.85 (approx. 13s.).

Dr. Nininger's book is a comprehensive, non-technical introduction to meteoritics—one of nature's most dramatic phenomena. It is of special interest to-day since the problem facing space-scientists concerned with the safe re-entry of space vehicles into the earth's atmosphere can be considered in relation to a phenomenon that has fascinated man for ages.

The author reveals that over 24,000,000 meteorites enter the earth's atmosphere each day. Of these, only one out of every 2,600,000 ever reaches the surface of our planet. The others, rushing into the atmosphere at 21 miles per second, are completely consumed by the enormous heat of friction generated by their motion through the air. The barrier of our atmosphere is so effective against these intruders from outer space that even the few surviving meteorites are rarely large enough to cause any damage. When a big meteorite does land, however, the results can be spectacular. On June 30, 1908, a meteorite landing at Tunguska Basin, Central Siberia, was heard 350 miles away. The tremor shook down houses within a radius of 20-30 miles, and the rush of air from the point of impact flattened more than 700 square miles of forest. The book, profusely illustrated, describes other famous meteorite landings and craters, and also tells how to locate, identify and preserve a meteorite that has survived its fall through the atmosphere.

House Organs

This is Magnesium. No. 1. Issued by the Magnesium Industry Council, Dickens House, 15, Tooks Court, London, E.C.4.

Like most JOURNAL readers, the reviewer always thought the outstanding feature of magnesium was its lightness, but now he learns from this magazine that it is the fastest machining engineering alloy. Machining costs so much these days that any reduction here can materially influence the profit and loss account. The examples of the uses of magnesium in industry in the booklet have been well chosen and excellently produced.

Nickel Bulletin—August, 1959. Published by the Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

The 70 or so abstracts published in this issue of the *Bulletin* cover electrodeposition; the use of nickel/iron films in digital computers and, in the section on cast iron, the inoculation of castings by vibration during solidification. Other abstracts are concerned with nickel-containing constructional steels and heat- and corrosion-resisting materials.

New Catalogues

Storage Bins. A leaflet received from Precision Components, Limited, 13, Byng Road, Barnet, Herts, details and prices a line of moulded-resin, stackable storage bins, trade marked "Kabi Plastibox."

Paint Removal. Southern Metalife, Limited, Station Square, Harrogate, have issued a folder detailing the properties of a material called Metastrip, which has been specially compounded to remove old paint and prepare iron and steel surfaces for further treatment.

Increases in Capital

ELBIEF COMPANY, LIMITED (formerly Warstone Engineering Company, Limited, Birmingham, increased by £52,500, in £1 ordinary shares, beyond the registered capital of £1,000.

S. DODD & SONS (MACHINERY), LIMITED, textile-machinery manufacturers, etc., of Oldham, increased by £19,900, in £1 ordinary shares, beyond the registered capital of £100.

SAUNDERS & TAYLOR, LIMITED, heating and ventilating engineers, etc., of Manchester, increased by £50,000, in £1 ordinary shares, beyond the registered capital of £50,000.

WELMIC CORPORATION, LIMITED, mechanical, electrical, and general engineers, etc., of London, W.C.2, increased by £47,000, in £1 ordinary shares, beyond the registered capital of £3,000.

POCKLINGTON & JOHNSON, LIMITED, precision spring manufacturers, etc., of Welwyn Garden City (Herts), increased by £10,000, in £1 ordinary shares, beyond the registered capital of £20,000.

SATELLITE ENGINEERING, LIMITED, East Hoathly (Sussex), increased by £10,000, in £1 8 per cent. non-cumulative redeemable preference shares, beyond the registered capital of £1,000.

BURNETT & LEWIS, LIMITED, humidifier manufacturers, etc., of Redhouse Industrial Estate, Aldridge (Staffs), increased by £10,000, in £1 ordinary shares, beyond the registered capital of £10,000.

PNEUMATIC COMPONENTS, LIMITED, Sheffield, increased by £99,350, in 25,000 10 per cent. cumulative preference shares and 74,350 ordinary shares of £1, beyond the registered capital of £100,650.

T. B. PEARSON & SONS (ENGINEERS), LIMITED, Walker, Newcastle-upon-Tyne, increased by £10,000, in 5,000 preferred ordinary and 5,000 redeemable preference shares of £1, beyond the registered capital of £50,000.

E. STEPHENS & SON, LIMITED, general engineers, etc., of London, E.C.1, increased by £20,000, in 15,000 ordinary and 5,000 5 per cent. redeemable preference shares of £1 each, beyond the registered capital of £10,000.

G. A. HARVEY & COMPANY (LONDON), LIMITED, metal perforators, tank makers, etc., of London, S.E.7, increased by £1,000,000, in £1 6½ per cent. 2nd cumulative preference shares, beyond the registered capital of £2,250,000.

B.S.A. SMALL TOOLS, LIMITED, Birmingham, increased by £79,000, in £1 ordinary shares, beyond the registered capital of £150,000.

METAL CLOSURES, LIMITED, West Bromwich (Staffs), increased by £400,000, in 4s. ordinary shares, beyond the registered capital of £600,000.

STAFFORD TOOL & DIE COMPANY, LIMITED, Stafford, increased by £7,000, in £1 ordinary shares, beyond the registered capital of £10,000.

J. C. PEACOCK (ENGINEERS), LIMITED, Birmingham, increased by £20,000, in £1 ordinary shares, beyond the registered capital of £10,000.

CARDIFF FOUNDRY & ENGINEERING (1947), LIMITED, Birmingham, increased by £36,000, in £1 ordinary shares, beyond the registered capital of £50,000.

PRECISION ALLOY CASTINGS (BIRMINGHAM), LIMITED, Birmingham, increased by £11,900, in £1 ordinary shares, beyond the registered capital of £100.

WHITE & POOLE, LIMITED (ENGINEERS), LIMITED, Wednesfield (Staffs), increased by £18 000, in £1 ordinary shares, beyond the registered capital of £2,000.

COATED STRIP, LIMITED, ironfounders, steelmakers, etc., of Walsall (Staffs), increased by £35,000, in £1 ordinary shares, beyond the registered capital of £5,000.

BURTON, GRIFFITHS & COMPANY, LIMITED, engineers, etc., of Birmingham, increased by £316,000, in £1 ordinary shares, beyond the registered capital of £120,000.

FURNIVAL & COMPANY, LIMITED, printers' engineers, etc., of Stockport (Ches), increased by £50,000, in £1 ordinary shares, beyond the registered capital of £50,000.

F. T. MYERSON, LIMITED, steel, iron, and metal workers, etc., of London, E.C.1, increased by £10,000, in £1 ordinary shares, beyond the registered capital of £10,000.

DEAN & LOWE, LIMITED, engineers, millwrights, and ironfounders, etc., of Stoke-on-Trent, increased by £89,900, in £1 ordinary shares, beyond the registered capital of £100.

B.G. MACHINERY, LIMITED, machine-tool reconditioners and dealers, etc., of Birmingham, increased by £156,000, in £1 ordinary shares, beyond the registered capital of £10,000.

JAMES WILDE & COMPANY, LIMITED, boilermakers and engineers, etc., of Ashton-under-Lyne (Lancs), increased by £12,500, in £1 ordinary shares, beyond the registered capital of £2,500.

B.S.A. BROACH COMPANY, LIMITED, manufacturers of implements and tools, etc., of Birmingham, increased by £46,000 in £1 ordinary shares, beyond the registered capital of £50,000.

TROUGHTON & YOUNG, LIMITED, electrical, mechanical, heating, and general engineers, etc., of London, S.W.3, increased by £399,900, in £1 ordinary shares, beyond the registered capital of £100.

DOUGLAS ALLEN, LIMITED, constructional engineers, etc., of Croydon (Surrey), increased by £23,750, in 4,000 8 per cent. preference shares of £1 each and 395,000 ordinary shares of 1s each, beyond the registered capital of £1,250. The 5,000 deferred 1s. shares in the existing capital have been converted into ordinary shares.